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## DIESEL RAILWAY TRACTION

*A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.*

## The Indian Railway Board

THE appointment of Mr. J. C. Highet—referred to on page 955—as Member of the Indian Railway Board, reminds one of the general lack of knowledge outside India of the constitution and functions of that body. The board consists of the Chief Commissioner, the Financial Commissioner and one Member only, three men, who directly control the administration of nearly 20,000 miles of State-worked lines, have a considerable voice in the destinies of a further 12,000, and whose power even over the remaining 10,000 miles of line is much greater than the British Ministry of Transport has over railways at home. Confusion often arises from the fact that under this small board there are five specialist advisers known as the Directors of Civil and Mechanical Engineering, Traffic, Finance and Establishment, but these so-called directors have no seats on the board. As the Financial Commissioner is not usually a railwayman it follows that very great administrative and technical responsibilities are vested in the two railway members of the board, the Chief Commissioner and the Member. One of their most important tasks is the selection of the Agents (General Managers) of the five great State-operated systems, a function referred to in our editorial note on April 17. Obviously the board has to rely largely upon the advice of these Agents in matters concerning the State systems, seeing that much of its time has also to be devoted to the other 22,000 miles of line operated by companies

or Indian States. Nevertheless, the volume of work accomplished by the board is stupendous, and the efficiency of the general administration of Indian railways is a great tribute to the ability of its members and its chosen advisors.

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## The Future of the Iraq Railways

The terms of the agreement for the transfer of the Iraq railway system from the British to the Iraqi Government have just been published as a Government White Paper and are summarised on page 948 in this issue. They provide for a composite board of management, consisting of two British—one being the General Manager or Director-General of Railways—and three Iraqis, including its President, for a period of 20 years from the date of the signing of the agreement. Also there are to be British heads and assistant heads in the technical departments of the railway, in addition to the Director-General and the Inspector-General of Traffic, throughout the same period. This is a natural and reasonable stipulation in view of the fact that the Iraqis are as yet scarcely competent to shoulder the responsibility of any senior railway appointment, least of all a technical one. It is, moreover, the rational course to leave the administration mainly in the skilled hands that have guided it to its present state of efficiency. Unity of control under one Director-General of both the railways and the Port of Basra should also make for even greater efficiency, so that the new administration has a bright future before it. We wish it all good fortune and a long and successful tenure of office.

\* \* \* \*

## The Week's Traffics

Comparisons of the past week's traffics of the four group railway companies are with those of the Jubilee week in 1935, and the passenger train receipts are all substantially down especially on the Southern. The shortage in passenger earnings was, however, more than made good by improvements in goods train traffics, except on the Southern on which these traffics are relatively of not so much importance as on the other three lines. For the year to date the gross traffics of the four companies together amounted to £52,794,000, an increase of £1,430,000, or 2.78 per cent.

	19th Week				Year to date	
	Pass.	&c. Goods	&c. Coal	&c. Total	Inc. or Dec.	%
L.M.S.R. ..	25,000	84,000	39,000	98,000	714,000	+ 3.42
L.N.E.R. ..	22,000	35,000	20,000	33,000	487,000	+ 3.17
G.W.R. ...	14,000	36,000	—	22,000	198,000	+ 2.31
S.R. ....	41,000	3,000	1,000	37,000	31,000	+ 0.47

This net increase of £1,430,000 is made up of increases of £894,000 and £599,000, respectively, in merchandise and coal, subject to a decrease of £63,000 in passenger train traffics. London Transport receipts for the past week were down £95,900.

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## The San Paulo Popularises Travel

Mr. Oliver R. H. Bury, Chairman of the San Paulo (Brazilian) Railway, was careful to emphasise at the company's meeting last Wednesday (see page 962) that, although the results for the past year may at first sight seem disappointing, allowance must be made in comparisons with 1934 for the fall in exchange and the collection in that year of £91,000 for freights outstanding and interest thereon. Excursions and week-end tickets have been increasingly patronised, and it is expected that the increase of fares since January 1 of this year will enhance the demand for cheap travel facilities. Ten new coaches and two locomotives are about to be delivered for excursion traffic, and the company is contemplating the order of two more diesel-electric trains for the same class of

service. It is satisfactory that despite the popularity last year of the cheap facilities already mentioned, passenger receipts advanced proportionately with the number of travellers. The hopes expressed in 1935 of a favourable hearing of the railway's case by the new Government have been realised, for a 15 per cent. increase of rates on all classifications except coffee was sanctioned as from January 1 of this year, and at the same time the Transport Tax was abolished.

\* \* \* \*

### The Severn Bridge Bill

The Severn Bridge Bill, promoted jointly by the Gloucestershire and Monmouthshire County Councils, was rejected on Tuesday after eleven days' hearing before a Select Committee of the House of Commons, presided over by Sir David Reid. The Bill, over which a long battle in the committee rooms was expected, came to an abrupt end when the committee after half-an-hour's deliberation declared by a majority that the preamble had not been proved. The decision was made after the promoters had presented their case and before any of the petitioners, among which was the Great Western Railway, were called upon to give evidence. The Bill proposed a bridge across the River Severn, at a site a few chains below the Severn railway tunnel, and involved an initial estimated outlay of £2,470,000 of which the Ministry of Transport would provide 75 per cent. Evidently the committee considered that the promoters had failed to show that this expenditure was justified on the grounds that the construction of the bridge would help in the relief of unemployment, and that it would prove a fillip to tourist traffic. Had the bridge been constructed, there might have been serious repercussions for the Great Western Railway. In addition to the serious loss of traffic that might have resulted, engineering difficulties might have arisen in connection with the tunnel, as the river bed at this point is notorious for its treacherous and irrepressible springs.

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### Unusual Poster Stamp Publicity Scheme

With the co-operation of the four main line railways, the Amalgamated Press Limited recently began an unusual form of publicity for railway travel through the medium of the *Children's Newspaper*, on similar lines to that organised in connection with the Southern Railway last year. Miniature reproductions in colour of forty railway posters of British holiday resorts, with brief descriptions of them, are being distributed with the newspaper at the rate of four a week for insertion in a small book supplied by the newspaper. When the album is filled, readers not over 15 years of age may enter a competition in which they mark the position of the forty resorts on an outline map printed in the centre of the book. For the best entries received, awards totalling 100,000 miles of railway travel in England, Scotland and Wales are to be made, the actual points of the journeys to be left to the choice of the successful entrants. The awards consist of 100 first prizes, each of 500 miles of travel, 100 second prizes of 300 miles and 100 third prizes of 200 miles. Winners of the travel vouchers may exchange them for railway tickets in favour of one or more members of their family.

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### A Cable Suspension Railway at Grenoble

One of the many views of Grenoble from the surrounding mountains may now be enjoyed by the visitor with none of the expenditure of personal effort hitherto called for. It is the justly celebrated one from the Fort de la Bastille, overlooking the valley of the Isère and the snow-

clad peaks from Mont Blanc to the Massif de Taillefer among which the river winds. Since September, 1934, the ascent of 262 m. from the centre of the town to the fort has been made by a cable suspension railway, a short description of which has recently been published in the journal of the Société des Ingénieurs Civils de France. There are two passenger cars, each suspended from an overhead cable and driven by cable from the electric winding station at the foot of the incline. The carrying cables are 673 m. long, and have a single intermediate support. Each car holds fifteen passengers and a conductor, and at the normal speed of 4.5 m. per sec. completes the journey up or down (the two cars running opposite ways at the same time) in 3 min. Allowing for the time necessary for loading and unloading, it is calculated that 225 passengers can be conveyed in each direction hourly. Judging by the patronage so far, an annual total of 90,000 passengers and a revenue of fr. 575,000 are expected.

\* \* \* \*

### U.S.A. Railway Fare Reductions

Eastern railway companies, with the exception of the Baltimore & Ohio, formally petitioned the Interstate Commerce Commission on April 6 for 18 months' delay in the introduction of the proposed scale of reduced passenger fares. It will be recalled that the commission prescribed on February 28 that the maximum passenger fares should be 2 cents a mile in coaches and 3 cents a mile in Pullman cars, with the Pullman surcharge eliminated. The order becomes effective on June 2, but most of the Eastern railways decided on March 28 to request the commission to postpone the date, and now the formal application has been made. When the order was issued, Mr. W. B. Calloway, General Passenger Traffic Manager of the Baltimore & Ohio Railroad, which has been the proponent among the Eastern railways of the lower passenger fares, said that the B. & O. welcomed the decision because it supported the company's policy and action taken during the past three years in endeavouring to bring about the reduction in the Eastern territory. He also felt gratified that the basis of fares ordered by the commission was the basis advocated by the Baltimore & Ohio. The lower fares have been in effect for some time in the Western and Southern sections of the United States, and railways on which they apply have been practically unanimous in stating that they have had a beneficial effect on passenger revenues.

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### The Intelligible Timetable

A correspondent in the *News Chronicle* has urged the public to prepare for the holiday season by acquiring the knack of reading timetables, and so save the time wasted by seaside inquiry office staffs in looking up simple train journeys. That such an appeal has been considered necessary indicates the discredit into which the timetable has fallen. It is, we think, largely a case of another dog being given a bad name, with the usual consequences, for we do not consider that timetables have increased in complexity or travellers in obtuseness since the days when any family could muster at least one qualified consultant of "Bradshaw" and its counterparts. Perhaps the appearance of the timetable, which for long failed to keep pace with developments in typography elsewhere, has been the chief factor to tell against it, and it is a hopeful sign for its future that this aspect is now being studied. We have already recorded the re-setting in Gill sans type of the L.N.E.R. official timetables, and the use of arrows (so much more arresting than rows of horizontal dots) to indicate non-stop running. Such attention to display is the best kind of timetable simplification.

### The Super-Chief

More than one new railway record has been created by the Santa Fé Railroad of the United States in putting into commission on May 12 the Super-Chief. It is the first regular train in the world, apart from the experimental running of the Union Pacific City of Portland last autumn, to travel continuously without change of motive power for over two thousand miles. And it is probably the first occasion in railway history on which a cut in time of over fourteen hours on the best previously existing train service between two great cities has been made, without change of route, at one operation. The Super-Chief makes one round journey each week over the 2,228 miles separating Chicago from Los Angeles. Leaving Chicago at 7.15 in the evening, it deprives the business man of only Wednesday on his journey, for it lands him in Los Angeles at 8 o'clock on Thursday morning. Actually the entire trip takes only 39½ hr. (allowing for two hours' difference between Central and Pacific time), which works out, including all stops and all the extremely heavy gradients through the Rockies, at an overall average of 56 m.p.h., and similarly in the opposite direction. However, the Santa Fé has won by only a short head from the Union Pacific-Chicago & North Western combination, whose streamlined eleven-car diesel-operated train City of Los Angeles, after exhibition at various cities in the Western States, goes into service today, when it leaves Los Angeles for Chicago, also on a 39½ hr. schedule, but over a longer route of 2,298 miles. The City of Los Angeles is to make one round trip every five days, leaving Los Angeles and Chicago at regular five-day intervals.

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### A High-Speed Brake of the Future?

The possibilities of wind brakes, an avenue yet unexplored, were briefly considered in the paper recently read by Mr. L. K. Silcox before the Engineering Institute of Canada, some points from which were noted in our issue of April 17. Dealing with high-speed trains, Mr. Silcox said that at 90 m.p.h. the head air resistance of the normal American streamlined train with a cross-sectional area of about 124 sq. ft. was approximately 1,500 lb., but if it were possible to gain the equivalent of a flat plate the size of the American loading gauge, the resistance, or retarding force, would be 4,200 lb. To gain this extra retarding effect the use of collapsible vanes was suggested. Although a vane corresponding to the profile of the loading gauge would be impracticable, there is nothing to limit the number of small vanes located down the train, and operated from the driving position either at the will of the driver or automatically with an emergency application of the continuous brake. Even with a two or three-car train it would not be difficult to get a simple arrangement of vanes which would more than double the head air resistance of a streamlined vehicle. Theoretically, such a brake would be very suitable for use in conjunction with the normal continuous brake, for its retarding force varies with the square of the speed, as does the kinetic energy of a moving train. Further, it is quite independent of the adhesion between the wheel and the rail.

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### Bishop's Castle Railway Demolition

Following the closing on April 20, 1935, of the Bishop's Castle Railway, it was decided to dismantle the track. This work was taken in hand towards the end of last year, and so far all the rails and chairs (but not sleepers) have been removed from Bishop's Castle to Lydham Heath (the reversing station) and from Lydham Heath to Eaton, where the demolition train has now

reached. It is headed by the 0-6-0 engine No. 2 *Carlisle* which is working tender foremost. At Bishop's Castle the engine and carriage sheds have been pulled down. The station offices are used by the Bishop's Castle Transport Company, and the goods building has been repaired and is now let. The goods wharf on the south side of Bishop's Castle station still remains, together with two cranes. The bridge over the Bishop's Castle-Eaton Road has been removed, leaving the stone facings to the embankment, but all other bridges are untouched. At Lydham Heath only the platform and station building remain. A correspondent writes that engine No. 1 (an ex-G.W.R. 0-4-2 tank) was seen recently at Plowden station attached to a line of wagons. The bodies have been removed from two coaches and the undercarriages (complete with gas tanks) are being used for carrying some of the rails removed. At Horderley station are two of the coaches, one 6-wheel and one 4-wheel. Both Plowden and Horderley stations have on the station platforms G.P.O. post-boxes which are still in use.

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### What Train Stops Cost

The time lost in bringing a fast train to a standstill and then accelerating to normal speed, and the fuel wasted on such occasions, are appreciable. In America some extensive tests in this connection were made a few years ago on the Illinois Central Railroad, when it was established that stopping an 11-car passenger train from a speed of 50 m.p.h., and afterwards accelerating to the same speed, cost 50 cents (say 2s.), and a delay of 3 min. The average cost with a 50-car freight train hauled by a 2-8-2 class locomotive at 25 m.p.h. was fixed at 90 cents (roughly 3s. 8d.) and the delay at 9 min., these tests being made on a level track in summer weather. Although the time lost in making train stops can be readily measured with accuracy, the figures as to actual money wasted have been accepted with some hesitancy by railway officers because of the difficulty of measuring the fuel and water required to maintain the firebed and water level during the test. These uncertainties, of course, do not occur with electric traction, and it is a sign of the importance now attached to the subject that at the recent convention of the Signal Section of the Association of American Railroads, the Committee on Economics presented a report on the cost of stops with electric trains.

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### Multi-Coupled Locomotives

Although there is still much useful work which can be adequately and economically performed by locomotives having only two pairs of wheels coupled, whilst single-driver engines in a modern form remain in service on one of the Continental railway systems, the bulk of new designs for heavy passenger service incorporate six, or even eight, coupled wheels. Nor is it difficult to cite instances of even more extended wheel arrangements in the strictly passenger category, apart altogether from articulated locomotives, which present the designer with better opportunities of utilising a large number of wheels coupled together. Certain Continental locomotive building firms have, during the past year or so, developed designs for engines having seven axles coupled in one group, and an engine of this type has been placed in extra heavy freight service in Russia. Fairly extensive use is made in Germany and several other countries abroad of ten-coupled engines, both tender and tank, and twelve-coupled types have been planned and occasionally built for mountainous districts in various parts of Europe. Above that number of coupled axles, it may be considered advisable in general to resort to articulation.



### Abyssinia and its Railway

MUSSOLINI'S announcement in Rome on Saturday that Italy had annexed the whole of Abyssinia, and the King of Italy had assumed the title of Emperor of Abyssinia, marks the beginning of a new period in the history of that country's railway. Contrary to the expectations of many, the railway has played no important direct part in the conflict and has not been the scene of fighting; in fact, it is understood to remain virtually intact. To a great extent this is due probably to the action of the French in detaining at the port of Djibouti arms destined for Abyssinia via the railway. It will be recalled that the railway is owned by a French company, but under the Franco-Italian Rome settlement at the beginning of last year (see our issue of February 1, 1935) Italy arranged to take over a parcel of shares. The last annual report of the Cie du Chemin de fer Franco-Ethiopien—that for 1934—showed the issued capital as fr. 17,300,000 in 34,600 shares of fr. 500. Of this total France is now believed to hold about 30,000; Italy 2,700; and Abyssinia the balance.

By the Franco-Abyssinian Convention of 1908 the French company bound itself not only to keep the railway running in the event of war, but also to work it in accordance with the Abyssinian Emperor's wishes. In October of last year it was stated in Paris that, although a clause permitted the portion of the railway in Abyssinian territory to be taken over by that country, the Emperor had been advised not to ask for the application of this clause. In fact the railway remained in the hands of the company, but a few days later it was reported that France and Italy had agreed that, if the latter refrained from damaging the railway, France—as the controller of the French Somaliland port of Djibouti, which provides the only outlet of the railway to the sea—would place an embargo on the import of arms by this route. On April 2 the Abyssinian Government, in its appeal to the League of Nations, asked "that all obstacles and hindrances which certain member States are placing in the way of the transport of arms to the Abyssinian troops should be removed," and later in the same month the Empress of Abyssinia's appeal stated "discrimination against us is aggravated by the fact that a large quantity of arms is still detained at Djibouti, although the Power controlling the railway is bound by treaty to transport such material to Abyssinia."

Thus the indirect effect of the railway on the conflict may have been of very considerable importance, but, as we are concerned primarily with the railway as a transport undertaking and not as a political weapon, it is enough to record that the Italian forces have in fact refrained from damaging the line and that traffic appears to have been conducted regularly until the morning of May 2, when the last train under the old régime was that which conveyed the Emperor from his country to Djibouti *en route* for Palestine. News of the week of rioting which followed has contained no intimation of serious damage to the railway, although precise information is lacking as to the condition of the handsome terminal station in Addis Ababa completed in December, 1929. After the Italian occupation of Addis Ababa, the train service is understood to have been resumed, the first passenger train leaving the capital on Saturday morning last, May 9. It now remains to be seen whether Italian rule under Marshal Badoglio, as the first Viceroy, will sanction the continuance of the existing arrangements with the French railway company. On the other hand, Italy may seek to increase the present Italian minority shareholding; endeavour to exercise the Abyssinian right to take over the portion of the line on Abyssinian soil;

treat past concessions and agreements as void. In any event, it must be remembered that railway access to the sea is through French territory, and that the only practicable new alignment to the Gulf of Aden would be through British Somaliland, as shown on the map published in our issue of October 11 last when we gave an outline history and description of the Abyssinian Railway.

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### Eighth Annual Review of Railway Charges

THE annual review of the standard and exceptional charges of the four main-line railway companies to be held by the Railway Rates Tribunal on May 20 will be the eighth since the new standard charges came into operation on January 1, 1928. This duty devolves upon the tribunal under Section 59 (1) of the Railways Act, 1921, which directs it to review the charges of all the amalgamated companies at the end of every financial year, unless the Minister of Transport decides otherwise. The Minister has not exercised his power to cancel the inquiry for 1935, and the tribunal has therefore called upon the railway companies to furnish detailed accounts and statements to facilitate the proceedings at the public inquiry. The first duty of the tribunal at the hearing will be to comply with Section 59 (3) of the Act, namely, to compare the net revenues for 1935, or the average annual net revenue of each company, with its standard revenue plus any allowances granted in respect of additional capital raised or provided in respect of expenditure on capital account incurred since January 1, 1928.

The standard revenues of the four group companies, including the allowances authorised by the tribunal for capital raised or provided between January 1, 1928 and December 31, 1934, amount to £51,313,579, but, as the net revenues of the companies during 1935 totalled only £32,921,754, they were £18,391,825 short of the standard, although this was an improvement of £1,427,326 compared with 1934. If, however, the average of the last three years' earnings is taken, there is a deficit of £20,244,702 (excluding the allowances now claimed for additional capital), so that by either method of calculation there is an extremely large deficiency. In these circumstances the tribunal is directed by the statute to consider whether the deficiency arose through any lack of efficiency or economy in the management of the undertakings. No such suggestion has yet been made on behalf of traders or the public at any previous review, and detailed evidence has been given on several occasions of the numerous directions in which the companies have endeavoured to secure economy in operation and maintenance without impairing efficiency. On this occasion the statements furnished by the railway companies indicate that while railway gross receipts increased by about £2,090,000 compared with 1934, railway working expenditure rose only by £614,000, and they will be able to show that these fairly satisfactory efforts to restrict expenditure, notwithstanding rising traffics, were not achieved at the expense of efficiency.

Should the tribunal be satisfied on this point, it will have to decide whether a similar state of deficiency is likely to continue. While the published estimates of the gross railway traffic receipts for the first seventeen weeks of 1936 show an increase of £1,335,000 compared with the corresponding period of 1935, the hindrance to trade which is being caused by the continuance of international, exchange, and currency difficulties, and the constant pressure of road competition, are material factors in the situation, as well as the question of the quantum of the relief likely to be secured eventually by the companies



under the Railways (Valuation for Rating) Act, 1930. If the tribunal is satisfied that the deficiency is likely to continue, it will have to decide what modifications, if any, it should make in the standard and exceptional charges to enable the companies to earn their standard revenues, plus the allowances in respect of additional capital, during the ensuing year. The companies were invited by the tribunal, as in former years, to express their views on this question, and they have reiterated that they are still doubtful whether a general increase of charges at the present time would materially improve their financial position, while the state of their revenue does not enable them to propose any reductions. At the same time they again intimate that they desire to reserve the right to bring forward proposals for increasing charges when, in their view, circumstances justify such a course.

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### Baltimore & Ohio Railroad

AN improvement of \$6,334,248 or 4.67 per cent. in the operating revenues of the Baltimore & Ohio Railroad for the year 1935 in comparison with 1934 was largely offset by an increase of \$6,126,356 or 6.17 per cent. in operating expenses, but total income was higher and the net deficit after providing for fixed interest and other charges was reduced from \$3,825,752 to \$3,180,908. Freight revenue increased \$6,489,164 or 5.58 per cent., but revenue tons only 2.46 per cent., the relatively larger increase in revenue being due to the emergency increase in rates granted by the Interstate Commerce Commission, which became operative on April 8, 1935. Passenger revenue on the other hand declined \$259,978 or 2.56 per cent., and there was an increase of \$105,062 or 1.16 per cent. in other revenues which included mail and express. The general financial position in the two years is indicated in the accompanying table:—

	1935	1934
	\$	\$
Operating revenues .. ..	141,873,643	135,539,395
Operating expenses .. ..	105,464,140	99,337,784
Net operating revenue .. ..	36,409,503	36,201,611
Taxes, &c. .. ..	12,110,546	12,523,672
Net operating income .. ..	24,298,957	23,677,939
Other income .. ..	5,141,403	4,837,613
Total income .. ..	29,440,360	28,515,552
Fixed interest and other charges ..	32,621,268	32,341,304
Net deficit .. ..	3,180,908	3,825,752

In operating expenses total maintenance costs increased \$2,758,484, or 6.93 per cent., of which increase \$298,365 was in maintenance of way and structures, and \$2,460,119 in maintenance of equipment. Included in the maintenance of equipment expenses were depreciation charges of \$7,110,663, a decrease of \$473,096 compared with 1934. Transportation expenses advanced to the extent of \$2,854,826, or 6.02 per cent. In addition to the expense of handling a greater volume of traffic, the restoration of rates of pay which were in effect prior to February 1, 1932, added approximately \$4,515,000 to operating expenses during 1935 over 1934. A reduction of 10 per cent. in basic rates of pay was made on February 1, 1932; of this 2½ per cent. was restored on July 1, 1934; 2½ per cent. on January 1, 1935, and the balance, or 5 per cent., on April 1, 1935. For the year 1931 the company paid the full 4 per cent. dividend on the preferred and 5½ per cent. on the common stock. Since then no dividends have been paid. Since the reorganisation of the company in July, 1899, dividends on its common stock were regularly paid until and including 1931, except for the period 1920-22 when Government control caused an inordinate swelling of railway expenditure. Eight per cent. was regularly paid from 1864 to 1871, and 10 per cent. on ten occasions between 1872 and 1885.

### Super-Acceleration

AMONG the accelerations of British main line services which became effective on May 4, savings of time of from 5 down to as little as 2 min. on long journeys came in for notice in the official announcements. The headlines which might have been necessary, by comparison, adequately to announce some of the changes being made from May 15 in the services of the Paris-Orleans-Midi Railway of France as described in detail on page 959 of this issue, baffle the imagination. Over main lines, for example, there is the acceleration of Train No. 51 by 2 hr. to Brive-la-Gaillarde and by 4 hr. 9 min. to Toulouse, or of night sleeper No. 73, which is to leave Paris 85 min. later but still reach Toulouse at the same time. Even so weighty a train as the Barcelona Express, with its fast timings over the exceedingly difficult grades of Central France, contrives a 41-min. cut in time to Port Bou, and is to average 45 m.p.h. over the entire 605 miles, inclusive of thirteen stops totalling over an hour. Across country, the night journey from Bordeaux to Geneva is to be 3 hr. 5 min. quicker than before, giving the Bordeaux business man the benefit of an extra morning in Lyons and an extra afternoon in Geneva; and a new railcar *rapide* between Bordeaux and Clermont-Ferrand will provide the link in a new fast day service between Bordeaux, Lyons, and Geneva. Certain stops made by the Sud Express are in future to be conditional, and one effect, with the acceleration of the morning express from Paris to Nantes, will be to introduce three non-stop runs over the 146 miles between Paris (Quai d'Orsay) and St. Pierre-des-Corps, all, of course, electrically worked.

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### Railway Wagon Control

ONE of the difficulties in maintaining an adequate supply of wagons is that the flow of freight train traffic between any two given points is rarely, if ever, equal in each direction. Generally speaking, stations in industrial areas forward more loaded wagons daily than they receive, and agricultural areas receive more wagons than they forward, but this broad rule has many exceptions. Freight train operation therefore necessitates the continual transfer of thousands of empty wagons to redress the balance. Moreover, to provide large numbers of vehicles, often at very short notice, according to seasonal and other demands, and at the same time to minimise shipping at the ports, gluts of seasonable and empty haulage, very careful control is necessary. The magnitude of the task can be visualised from the fact that during last year the four main line companies conveyed over 260 million tons of traffic by freight trains, utilising over 600,000 railway owned wagons, as well as a very large number of privately owned wagons, the latter being used principally for the conveyance of coal, coke and mineral traffic. During the twelve months the total loaded wagon journeys exceeded thirty millions, while the distance covered by freight trains aggregated over 129 million miles.

One of the most important factors in wagon control is the common user system, under which the main line companies have pooled the bulk of their ordinary open and covered wagon stock up to and including 12-tons capacity. The probable demands for wagons have obviously to be estimated in advance, and local station-masters, goods agents and railway staffs are in constant touch with traders for this purpose. As the result of these contacts, demands and advices from railway stations, districts and divisions are concentrated in the

central wagon control throughout the day and night. Reports are also received periodically of the number and type of wagons likely to be unloaded during the day in order that these may be taken into account in estimating the wagon requirements for the following day. At stipulated times during each day the general position throughout the railway system is reviewed, and estimates compiled of the numbers and types of wagons required. The distribution arrangements cover many types of vehicles other than ordinary open and covered stock: for instance, requisitions are daily received in large numbers for vehicles fitted with automatic brakes for travelling on express goods services, cattle wagons, meat, fish and banana vans, &c. A special card index is kept to show the movements of wagons designed for exceptional loads. By these means it is possible to ensure the supply of rolling stock in large numbers and of specified types wherever the requirements of trade and commerce demand it.

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### Continuous Welding of Rail

UNDER this heading the Committee on Rail of the American Railway Engineering Association has recently issued a report showing the experience with experimental lengths of continuously welded rail under traffic of the Boston & Maine, Central of Georgia, Clinchfield, Chicago

Surface Lines, Delaware & Hudson, and Bessemer & Lake Erie Railroads. In the first three the welds are in tunnel, and vary from 2,457 ft. on the Central of Georgia, to 17,600 ft. in the Hoosac tunnel of the Boston & Maine. Both lengths were laid in 1930, over both there is a speed restriction of 30 m.p.h., and the costs per weld were \$4.30 and \$5.91 respectively. Of the 126 welds in the former only four have failed, but of the 1,231 of the latter there have been 308 failures, attributed to the fact that the work was done before this sort of welding had been perfected. The Boston & Maine, however, expects a saving of \$1,500 a year in labour, and on the Central of Georgia, where relaying has hitherto been necessary every three years, the life of the rail has been doubled. In no case has creep been experienced, and special provision for expansion at the ends of the long lengths has not been found necessary. Failures, except those already mentioned, have been almost negligible. The weight of rail involved varies between 90 lb. and 131 lb. Three types of weld have been tried, namely, the oxy-acetylene Oxweld V type, the Thermit weld and the electric flash weld. The cheapest of the welds was that on the Central of Georgia, already quoted, and the most expensive the 1933 experiment on the Delaware & Hudson with a cost of \$19.53. The former was the Oxweld V type and the latter the Thermit. The Delaware & Hudson was the only line to try the electric flash weld last year, and records \$9 as the cost of that type.

## LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

### Beyer-Garratt Locomotives for Algeria

London, May 11

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I read with much interest the article in your issue of March 27 on the Beyer-Garratt express locomotive built in France recently for the Algerian Railways. This is unquestionably a very fine engine reflecting credit on its designers and builders, and although possessing certain features of a more or less complicated description—unnecessarily so, perhaps, in the opinion of most British locomotive engineers—one can only feel admiration for such a splendid example of modern articulated locomotive design.

There is, however, one point about which I would like,

if possible, to obtain further information. It seems to me rather risky to employ electrical control of the reversing mechanism in a country such as Algeria, and I would be glad if you, or the builders, would explain what happens in the event of the mechanism failing. If this occurred in some remote part of the line where it would be difficult or impossible to get matters put right, considerable delay and inconvenience would be the natural result, and the advantages, whatever they amount to, of adopting this type of control hardly seem sufficient to warrant the taking of this risk.

It would, I think, be of interest to others as well as myself if a diagram could be published showing the electrical circuit in detail.

L. B. BILLINTON

### The Bristol & Exeter Railway Centenary

In an editorial article on page 4 of our January 3 issue, we mentioned that during 1836 no fewer than 35 Acts of Parliament relating to railways received the Royal Assent: 29 were for new companies and authorised the construction of 955½ miles of line. One of the most important of the newly-formed railway companies was the Bristol & Exeter, and, as the centenary falls during the coming week, the current issue of the *Great Western Railway Magazine* has given an outline of its story.

The Bristol & Exeter Railway Act, which received the Royal Assent on May 19, 1836, recited that the line was to begin "by a junction with the Great Western Railway in a certain field called Temple Mead in the Parish of Temple otherwise Holycross in the City of Bristol" and terminate "at or near the City of Exeter, in the Parish of St. Thomas the Apostle." No reference to the gauge appears in the Act, but the intention was, of course, to adopt the broad gauge of its neighbour, the G.W.R. The financial stringency which followed the short-lived railway boom of 1836 resulted in non-payment of many share calls and the ultimate forfeit of 4,000 out of 15,000 shares from the unwillingness or inability of shareholders to pay calls

as they fell due. The Bristol & Exeter directors had great difficulty in these circumstances in raising the capital necessary to proceed with the works. An arrangement was come to, however, in 1841, to lease the line to the G.W.R. from the date of its opening for a period of five years from the completion of the line to Exeter, at a rental of £30,000 a year, and by this arrangement the financial position of the company gradually improved, resulting in the speeding-up of the work of construction.

The first section, between Bristol and Bridgwater (together with the Weston-super-Mare branch) was opened on June 14, 1841. Taunton was reached on July 1, 1842, and Beam Bridge (about 1½ miles beyond Wellington) on May 1, 1843. Whiteball tunnel—1088 yd. long—the only engineering work of any importance on the line, was finished in the spring of 1844, and the opening to Exeter took place on May 1 of that year. The G.W.R. lease was terminated in April, 1849, when the Bristol & Exeter Railway began its independent operating existence, which lasted until the end of December, 1875. The undertaking was absorbed by the G.W.R. as from January 1, 1876, under the terms of an Amalgamation Act of June 27, 1876.

## PUBLICATIONS RECEIVED

### La Station d'Essais de Locomotives des Grands Réseaux Français.

By M. Pierre Place, Ancien Élève de l'École Polytechnique, Ingénieur Principal, Chef de la Division des Essais à l'O.C.E.M. Paris: Société des Ingénieurs Civils de France, 19, Rue Blanche (9c). 9½ in. × 6¼ in. 32 pages. Illustrated.—The main features of the Vitry locomotive testing station are now fairly well known here and have been described by an illustrated article in *THE RAILWAY GAZETTE* of September 18, 1934, but this paper gives a comprehensive and very well-arranged account of the aims of the plant, its general layout, the constructional details of the brakes and dynamometer, and the special devices to ensure accuracy. It is of the greatest value that actual figures, both designed and realised, are given for the percentage accuracy obtainable in the tractive force measurements; and the attention that is paid to the question of maintaining this accuracy in use is still more reassuring. The method of ensuring that each locomotive wheel is exactly in the vertical axis of the corresponding test roller is so satisfactory that the error in the tractive force measurement due to this cause is kept well within 1 per cent., and within the limits of error due to the friction in the hydraulic dynamometer itself.

Great stress is laid throughout the paper on the advantages afforded by such a stationary plant as compared with road tests, but it appears that the author has only road tests under ordinary service conditions in mind. Few engineers would nowadays claim any great scientific value for such tests, but in view of the development and extensive practice in other countries of special methods of road testing under constant conditions which do permit of the measurement of the horsepower at the rim of the driving wheels, one feels that the matter is hardly one to be dismissed so summarily. It is also stated that tests on the stationary plant are cheaper than road tests. We were informed when visiting the German test plant at Grunewald a year or so ago that the plant was used only for tests of a special character, and that performance tests were carried out by the method of brake locomotives on the road, because tests on the stationary plant were so much more expensive. It is not questioned that both statements are true for the circumstances of the respective cases. But it is evident that in the absence of actual data regarding costs too much importance cannot be attached to such generalised comparisons.

The paper concludes with a section devoted to results obtained on the plant. To this we naturally turned with some eagerness, for in any research it is the results rather than the apparatus employed which are of greatest interest. The paper, however, gives particulars only of the number of locomotives that

have been tested and of the excellent behaviour of the plant during the tests. We hope that M. Place will publish at a later date full particulars of the data obtained, at least for a few selected locomotives. It is not too much to say that the bulletins of data obtained on the Altoona test plant, which have been published from time to time, have contributed more to the improvement of the efficiency of the steam locomotive than anything else. Even if the locomotive test plant is regarded as a routine laboratory rather than as a research station, it is still desirable that as much data as possible should be published. There is a complete dearth of really accurate detailed data of the performance of modern European locomotives. The now quite respectable list of testing plants in Europe prompts the hope that this will presently be remedied.

### Principles of Combustion in the Steam Boiler Furnace.

By Arthur D. Pratt. London: Babcock & Wilcox Limited, 35, Farringdon Street, E.C.4. 9 in. × 6 in. 112 pp.—Written primarily for power plant owners and engineers, this book, revised for 1936, has a well-defined interest for all large-scale users of fuel, furnace operators, and others concerned. It is divided into 13 sections covering the chemistry of combustion and numerous other aspects of the subject and finishing with a section on heat balance, solid or liquid fuels, and gaseous fuels. The author writes with authority and resorts to the treatment by analysis of many of the aspects of his subject, a method which considerably enhances the value of the work. In the aggregate there is a considerable amount of ignorance regarding the important matter of fuel combustion, and this book should go a long way towards dispelling such lack of knowledge, especially as it is written in a particularly clear and straightforward manner and presented in a style which, for clearness of print and general layout, leaves little or nothing to be desired.

**French Holiday Literature.**—The P.O.-Midi Railways have adopted a novel method of distributing advertising pamphlets relating to the same holiday area, enclosing them in pocket-size folders with attractively coloured covers. Thus, literature dealing generally with the Basque country and the Western Pyrenees, as well as descriptive matter devoted to the individual resorts, reaches us in a single folder of the type described. These booklets are all in English, but even were they in the unfamiliar dialect of the Basques themselves, we imagine that they would command immediate attention by reason of their design and colouring, and the care with which the illustrations have been selected and reproduced. A similarly high standard is displayed in a number of other booklets from the P.O.-

Midi and P.L.M. Railways, describing holiday areas and health resorts served by the companies. For intending visitors to Algeria and Morocco, the P.L.M. publishes two handsome "atlases" with full-page maps, coloured plates, numerous illustrations, and descriptive text. The P.L.M. also sends a folder, entitled "P.L.M.—Confortablement," in which the title is justified by interior views of ordinary coaches, sleeping cars, Pullmans, and railcars. Included in the selection of literature we have received is Mr. Charles Graves' book, "The Riviera Revisited," which we reviewed in our issue of December 20 last.

**Bath.**—The Spa Committee of the Bath City Council has recently issued an attractive brochure describing the amenities of this famous West Country health resort. The cover design is that of a railway poster issued in conjunction with the L.M.S.R. and G.W.R. It is a pity, however, that co-operation with the railways stops short there, and that the R.A.C. map included in this otherwise excellently produced publication omits the railways and shows only the roads.

**Factory Sites.**—The Great Western Railway has published an illustrated booklet drawing attention to the many attractive sites available on its system, and the facilities offered to those who choose them. The company assists prospective factory builders and purchasers by furnishing them with details regarding sites, power and water services, and the supply of labour. The Chief Goods Manager will also arrange for purchasers to be conducted over sites and premises by an experienced representative of the company. Specimens of modern factory buildings erected on the G.W.R. illustrate the booklet, and a folding map shows the extent of the system.

**Chart Recorders.**—We have received from the Drayton Regulator & Instrument Co. Ltd., West Drayton, Middlesex, an illustrated folder dealing with dial-type chart recorders for temperature, pressure, vacuum, and liquid level, as well as combinations of these functions. They are made in two sizes, with charts of 10 in. and 12 in. dia. Both are suitable for a two-pen record, and the 12-in. charts will also take a three-pen record. The clockwork mechanisms are fully jewelled and readily accessible for regulation. The standard speed of drive is one chart revolution in 24 hr., but if required periods of revolution of from 4 hr. to 7 days can be provided for.

**Bruce Peebles Calendar.**—The subject chosen for illustration on this year's calendar issued by Bruce Peebles & Co. Ltd., of Edinburgh, is Dunvegan Castle, the ancestral home of the MacLeod of MacLeod's in the Isle of Skye. The calendar is current for the period May, 1936, to April, 1937. Monthly tear-off sheets bear the calendar for the current month, together with those for the immediately preceding and following months. On each sheet are illustrations of Bruce Peebles products.



## THE SCRAP HEAP

### SECOND CLASS

In George du Maurier's view, second class compartments were occupied chiefly by the maids and valets of profiteers, while ancient and impoverished nobility travelled third class. Others sometimes used them, however. It was an old lady in one who, during a dispute over opening a window, told the man opposite her that he did not know the difference between the various classes of passenger. "Oh, but I do!" he exclaimed. "First class passengers are rude to the guard. The guard is rude to third class passengers. Second class passengers"—with a bow towards her—"are rude to each other."—From the "Daily Mail."

In two places in the northern part of Northumberland two disused stations have been transformed into permanent residences. One is occupied at weekends by a clergyman and the other has a tenant all the year round. Then at Kenton Bank Foot, on the old Ponteland line, which is no longer used for passenger trains, the waiting room has on several occasions been used as a theatre. Generally this miniature theatre is marked "full house" whenever a play is presented. Wooler station is a rendezvous for hikers. Some time ago the waiting rooms of this little station were let by the L.N.E.R. to the Youth Hostels Movement.—From the "North Mail."

On excursion trains on the German railways last summer, each compartment was provided with a loud speaker, through which were played the local airs of each locality traversed. However, the important development was not so much the playing of the airs as the fact that provision was made for turning the thing off if the individual passenger didn't want to hear it. Our American contemporary the *Railway Age* comments—"as one of the few who has not yet injured himself to listening to the proclaimed virtues of this soap or that tooth-paste while trying to read or to write or simply to think, such a gadget on our own radio-equipped trains would be a godsend, but, it seems, alas, impossible. As an alternative, perhaps American railways, particularly in the South, might supply cotton for ear-stuffing to such passengers as do not care particularly for old jokes that weren't funny even when new."

### MORE A.T.C. BRAINWAVES

In our issue of March 20 last we quoted an American inventor's ideas for using skunks for train stops. Mr. Charles Frederick Carter of the New York Central Railroad, in his lecture before the Rochester (New York) Engineering Society on February 10, 1928, also instanced early examples of true mechanical train stops, as follow: Other vagaries in the evolution of auto-

matic train stops included a chain with a big hook on the end laid between the rails. When you wanted to stop a train automatically this big hook sprang up and grabbed an axle—the inventor wasn't particular which axle, because in any case the joke was on the train; for the other end of the chain had a weight on it hanging down in a well between the rails. Finding it couldn't pull the weight out of the well, the train was expected to be reasonable and stop. Still another automatic train stop proposed consisted of a spiral track at the points at which you wanted to stop trains automatically. All you had to do was to throw a switch and let the train in on the spiral track where it would run round in circles, like a dog chasing its tail, until it got tired and stopped.

In the L.N.E.R. first class waiting rooms at Newmarket station a fine collection of 34 sporting pictures, the majority of which are of considerable antiquarian interest, has been displayed as a permanent addition to the existing poster pictures which formerly decorated these rooms. The collection has been assembled by Mr. Dandall Davies of 1, Cheyne Gardens, Chelsea, who is a well-known connoisseur, and the management of the L.N.E.R. has gladly given permission for the pictures to be displayed at Newmarket station. The collection includes "A Newmarket Sketch" published by Ackermann in 1826; Landscape with three horses by Otto Weber (bearing the artist's signature); a beautiful colour plate of *Phar Lap*, winner of the Melbourne Cup, from

a painting by Daryl Lindsay, 1931, bearing the artist's signature; reproduction of a print of "A Country Racecourse, 1785," bearing the "Exchange Telegraph Company's compliments 1904"; and a French engraving "Le Vin de L'Etrille" taken from a mural painting by Wouvermens in the Chateau of Monseigneur Le Prince de Carignan, 1739, engraved by Moyreau, Paris, engraver to the King, obviously dating from pre-Revolution days.

We should be glad to know the name of the Past-President who, by some misdirection of the attendant to his first class sleeper, intruded unexpectedly upon a French lady robed for retiring in a kimono and little else. In a fury of virtuous indignation the lady exclaimed: "Go away, toute de suite, you 'orrid, veeked old man, or I shall scream for—vot you call 'im—ze berth-controller!"—From "The Electrical Contractor and Retailer."

### BELIEVE IT OR NOT

The two travellers were gazing out of the compartment window as the train sped through the countryside close alongside a waterway. Said one to the other, "I once caught an enormous eel in that river."

"That's not a river," remarked the other, "it's the London-Birmingham Canal."

"Be that as it may," rejoined the first, "the eel was so tremendously strong that it got away from me and worked its way on to the railway line where it got caught up in the wheels of a passing train and was killed."

"H'm. Case of 'eels within wheels,' eh"!!



Passenger train of the old San Francisco & San José Railroad, the first railroad out of San Francisco to be built. This picture was taken in 1866, two years after this pioneer line, now a part of Southern Pacific Coast Line, was opened to traffic from San Francisco to San José on January 16, 1864. The locomotive "San Mateo" was built by Danforth Cooke & Co. It weighed 46,000 lb., had 14 in. by 22 in. cylinders, and driving wheels 5 ft. in dia. It later became No. 5 of the Southern Pacific and was for some years used as a shunting engine in the San José yard

## OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

### ARGENTINA

#### Buenos Aires Association of the Institution of Civil Engineers

The opening meeting of the 1936 session was held in Buenos Aires on April 7, when the Chairman, Mr. John H. Taylor, M.Inst.C.E., delivered his inaugural address on "The Application of Scientific Research to Engineering." This dealt with the efforts being made in Great Britain in the direction of applying scientific research to industry, and described many of the organisations, both national and private, which have been instituted for the purpose. The chairman then passed on to a description of some of the outstanding achievements resulting from research in fuels, iron and steel, the automobile industry, the aircraft industry, ship-building, the building trade, the electrical industry, the railways and in the preservation of overseas foodstuffs.

At the conclusion, Mr. M. F. Ryan, C.B.E., General Manager, Buenos Ayres & Pacific Railway, proposed, and Sir William Ellis, G.B.E., a Past-President of the Institution of Civil Engineers, seconded a vote of thanks to Mr. Taylor for his able and interesting address.

The following committee has been elected for the current year:—

Chairman, Mr. J. H. Taylor; Vice-Chairmen, Messrs. M. F. Ryan, F. L. Creswell, L. A. Woodbridge, and H. A. MacGillicuddy; Members, Messrs. J. G. Duncan, W. G. Pound, G. H. Austin, J. F. Main (Hon. Secretary), F. W. Butler (Hon. Treasurer), and H. W. Stevens; Students, Messrs. G. C. Burton, J. R. Cork, H. R. Pritchard, and T. Rodgers.

#### Local Purchases by the Railways

The Instituto de Estudios Económicos del Transporte has just issued an analysis of the increase during the last four years in the purchase by the various railway companies in the country of raw materials and manufactured articles of Argentine origin. The analysis states that, during the 10 years prior to the economic crisis, the purchases by the privately-owned railways amounted to some 100 million pesos per annum, of which sum about half was for extensions and improvements to the lines, the balance being absorbed in working expenses. Since 1931, new investments of capital have been rendered impossible by the precarious financial situation of the companies, with the result that about 90 per cent. of the purchases have been for account of working expenses.

An analysis of the balance sheets for the last four years of the Central Argentine, B.A. Great Southern, B.A. Western, B.A. & Pacific, Córdoba Central, and Entre Rios & N.E. Argentine Railways, which comprise about 80 per cent. of the privately-owned lines, shows a progressive increase in the purchase of locally-produced materials and articles. During the financial

period 1930-31, the percentage of the total was 17.4. In 1931-32, it had risen to 29.1 per cent., owing largely to the fact that the bulk of the articles were for account of working expenses. In 1932-33, due to the same circumstances, the proportion rose to 35.3 per cent. In 1933-34, it was approximately the same (31.5), and the figures so far available indicate that 1934-35 followed the same trend.

#### Values and Species of Local Supplies

The value of the articles and materials of Argentine origin purchased during each of the periods cited above amounted to, approximately, \$23,000,000, \$15,000,000, \$13,000,000 and \$13,000,000 paper, respectively. The articles purchased included sleepers, oil fuel, stone ballast, firewood, timber, sand, bricks, lime, textiles, uniforms, wines, cigarettes, alcohol, soap, grease, disinfectants, sacks, and a great variety of minor requisites.

The report states that about 70 per cent. of the working expenses is absorbed by salaries and wages paid to the 131,000 employees of all categories, and amounting in the aggregate to some 254 million pesos per annum. Furthermore, in addition to direct local purchases by the companies themselves, some \$120,000,000 are spent in the country by the employees in the form of house rents and articles of domestic consumption.

#### Countries Supplying Various Materials

With regard to the countries of origin of materials imported by the railways, the report quotes figures supplied by the "Dirección-General de Estadística," which show that Great Britain predominates, although not exclusively. From 1920 to 1935, 1,635 locomotives were imported, of which 786 (or 48 per cent.) were British. During the same period 352 passenger coaches were imported, of which 267 (76 per cent.) were British. Of 8,282 goods wagons imported during the same period, 3,247 (39 per cent.) were British. Between 1920 and 1934, 1,204,000 tons of rails were imported, of which 615,000 tons (51 per cent.) were British.

Summarising the above figures, the report states that the local purchases made by the railways, or as a result of their activities, slightly exceed the following amount on an average of the last four yearly balance sheets. Direct purchases of Argentine products made by the above-mentioned companies (which represent approximately 62 per cent. of the total, including the State Railways), \$16,000,000. Indirect purchases through the expenditure by the employees amount to \$120,000,000, or a total of \$136,000,000. The foreign

purchases of the same companies amount to some \$50,000,000 per annum, mainly for articles or materials which are not yet produced in the Republic.

### BRAZIL

#### Proposed Signalling Standardisation

The question of signalling was brought before the First General Transport Congress at Porto Alegre in November last by Senhor Flavio Vieira, who drew attention to the necessity of adopting up-to-date equipment if the railways were to play their part in the scheme for the co-ordination of transport, which the Government was endeavouring to promote. Compared with most countries Brazil was decidedly backward in this respect. Even on the five leading lines the proportion of stations equipped with satisfactory safety devices was relatively small, although what installations there were usually represented good practice. Only one line made use of track circuiting to any great extent. The present small amount of signalling was far from uniform in type and different methods of working were even seen on the same railway. Some attempt at standardisation of principles at least ought to be made, to facilitate the extension of interlocking and block working, so urgently needed, and prevent the existing confusion from growing. It is, however, essential to hasten cautiously in such an important matter, and be sure of getting the best technical advice before making decisions. The suggestion was made, and will apparently be acted on, that the subject should be considered by a meeting of engineers and traffic officers, specially qualified to deal with it, at Rio during the present year, the first step being to lay down some principles to guide future work.

### SOUTH AFRICA

#### Financial Position

The results of working for the eleven months, April, 1935, to February, 1936, show a surplus of £3,156,800 in revenue over expenditure, after allowing for special appropriations of £733,333 to Betterment Fund; £446,416 to deficiency in Pension and Superannuation Funds; £916,667 to Rates Equalisation Fund; £103,903 Responsibility Allowance; and £366,667 to writing out of capital account discount and expenses on pre-Union capital. Revenue from transportation services for the period totalled £27,494,914, an increase of £2,869,706 on the previous year. Railway working expenditure increased from £16,667,843 to £17,846,280.

#### Johannesburg—Cape Town Record Run

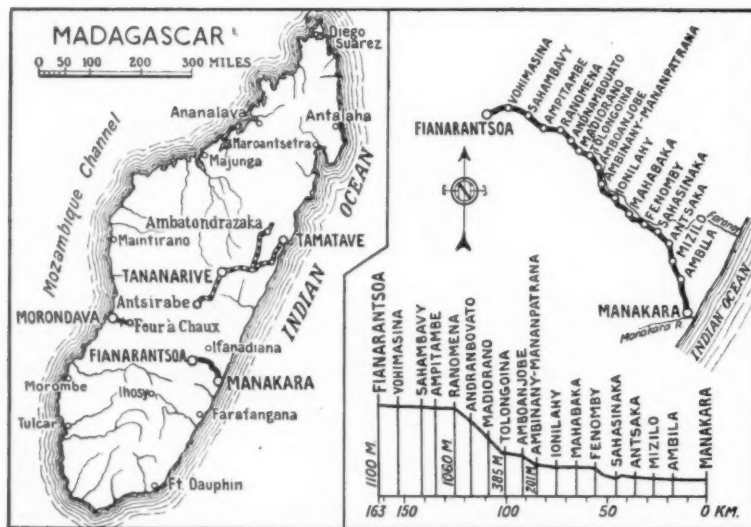
All previous records have been broken by a special test train run from Johannesburg to Cape Town. The journey was completed in 25 hr. 15

min., the average speed for the running time being 42 m.p.h. The load of the train was 500 tons. Engines were changed at Kimberley, Beaufort West, and Tlouws River. The chief object in running this train was to ascertain whether the average speed could be improved without increasing the maximum speed, without running undue risks and without the discomfort of excessive oscillation. A dynamometer car was attached to the train, and the data obtained will be used for the possible acceleration of train services between Johannesburg and Cape Town. The test train was similar in weight and composition to the existing fast trains. The present running time of the Union Limited is 27 hr. 28 min. The return journey was made in 26 hr. 33 min., which is 2 hr. 14 min. less than that of the Union Express.

## MADAGASCAR

## New Line Opened

The new line connecting Fianarantsoa in the Province of Betsileo and Manakara on the east coast [described in these columns of our issue of August 2 last. The opening was also briefly recorded in our news on page 880 in the issue of May 1.—Ed. R.G.] has now been officially opened for traffic by the Governor-General. Its opening marks the completion of a notable engineering feat as the line climbs through difficult country to the plateau of Betsileo, a vertical height of all but 2,800 ft. being surmounted in a distance of 26 miles. No fewer than 51 tunnels were necessary, besides an aggregate length of over 900 ft. of anti-avalanche galleries, and there are several big bridges also. The actual length of line just opened is 49 miles, the first 52 miles to the foot of the mountain section having been opened in July, 1934. It is the difficult hill section, therefore, which has now been opened.



*Map, plan, and section of new Madagascan line*

## ITALY

### Further Electrification

A further 261 km. (162 miles) of the State Railways have now been equipped and opened for electric traction. The sections concerned are: Trieste-Monfalcone, Gorizia-Udine, and Monfalcone-Cervignano, in the extreme north-east. The frontier at Tarvisio is thus connected with the Adriatic by electric railway. This brings the total electrified length of State lines to 3,433 km. By the end of October next, the Trieste-Postumia and San Pietro del Carso-Fiume lines should be electrified, and in 1937 the 420-km. Salerno-Reggio Calabria, Ovada-Asti, and the 140-km. San Giuseppe-Alessandria sections are expected to be electrically operated; the total length so worked will then be 4,000 km.

## The Future Programme

Arrangements are also being made to electrify the Rome-Leghorn, Ancona-Bologna-Milan, Orte-Falconara, and Milan-Voghera lines, ready for opening in 1939. It is estimated that by then the State Railways' present coal consumption, 3,000,000 tons a year, will be halved.

In spite of pressure from Milan commercial bodies, it is unlikely that the Milan-Chiasso and Milan-Domodossola sections will be electrified before 1940, in the course of the second electrification period, which will also include the Milan-Turin, and Milan-Venice-Cervignano routes.

## Streamlined Trains

The State Railways administration, having decided upon a general policy of running streamlined expresses throughout the country, has arranged for the construction of (a) a number of diesel-engined units, for use on non-electrified main lines, and (b) of electric streamlined sets by the Breda Company at Sesto Sah Giovanni. Apart, how-

ever, from the motive power, trains of types (a) and (b) are practically identical. They are each three-car articulated units with an over-all length of some 197 ft. The streamlining is expected to save about 30 per cent. of the power required.

Air-conditioning is provided throughout, all windows being permanently closed. Other special features are: concealed lighting, extra-comfortable seating, and moveable tables between the seats. The central car in each unit accommodates 35 first class passengers, and in the two end cars there are seats for 59 second class, in two compartments, and a kitchen, pantry, baggage and mail compartment. Oil-fired heating apparatus is provided.

## FRANCE

### New Works at Belfort

The main station at Belfort is being rebuilt and enlarged. The platforms have been lengthened and new concrete awnings and supports provided. A tiled subway has been built to connect the platforms with each other and with the entrance and exit. The station buildings and approach are to be remodelled but this work has not yet begun. Colour-light signalling is now in operation and is controlled from a new signal box at the east end of the station.

## IRAN

**State Railways Department**

Considerable progress is being made with the construction of the Trans-Iranian railway from the Caspian Sea to the Persian Gulf, and on September 24 last (1st Mehr, 1314) the Iranian State Railways Department was established, under the management of Mr. Parviz Bahman as Acting Director. He took over control, not only of the uncompleted Trans-Iranian line, but also of the 1-524 m. (5 ft.) gauge railway from Tabriz to the Soviet frontier at Julfa, with a branch to Cheraf Khan, making 200 km. of this gauge. There are 13 stations on these two lines, served by 13 locomotives, 13 carriages, and 239 wagons; these figures show increases of 3 locomotives and 17 wagons during the past year.

## Trans-Iranian Railway Progress

On the north-south line, railhead from Bandar Shah (on the Caspian) has now reached Doab—a distance of 192 km. This section is being worked with 25 locomotives, 10 carriages, and 281 wagons, and 12 stations are in service. In the south the line from Bandar Shahpur (on the Persian Gulf) now extends some 307 km. to a point called Galesheik, north of Salehabad. This is at present the longest stretch of railway in the country and has 22 stations, 22 locomotives, 6 carriages, and 324 wagons. The whole of the Trans<sup>1</sup> Iranian line is, of course, of standard (4 ft. 8½ in.) gauge.



## BEHAVIOUR OF SCREW FASTENINGS IN WOODEN SLEEPERS

*Durability tests reveal the effects of load conditions, loosening and weathering*

INVESTIGATIONS carried out in the Department for the Testing of Materials at the Technische Hochschule, Stuttgart, by Professor Dr.-Ing. Carl Pirath in collaboration with Professor O. Graf and others, have led to interesting results concerning the behaviour of screwed connections in wooden sleepers under various conditions of dynamic loading and weathering. The purpose of the dynamic tests was to determine the variations in holding power of the fixing screws under service conditions of loading of the permanent way during a period of 10 to 15 years' also, the behaviour of the soleplate under the same conditions. The magnitude and direction of service loads could be reproduced with reasonable accuracy by a machine of the fatigue-testing type, thus compressing within a period of 6 to 8 weeks the equivalent of 10 to 15 years' service so far as dynamic loading is concerned. As regards weathering and decay, however, alternate wetting and drying of the sleepers during the laboratory test cannot reproduce the full effects of natural weathering during a long term of years. Nevertheless, useful information is obtainable concerning the deterioration produced by the ingress of water.

### Conditions of Loading

The behaviour of the permanent way was investigated under vertical load alone and under combined vertical and horizontal loading, the values chosen being 4.2 metric tons (4 tons 2 cwt. 2 qr.) vertical and 1.7 metric tons (1 ton 13 cwt.) horizontal load. In 1929, the German State Railway main line carried a daily average of:

300 passenger coaches, 3 axles each =	900 axles
1,000 goods wagons, 2.1 axles each =	2,100 axles

Total = 3,000 axles

and, since two-thirds of the mileage was double-track and one-third single-track, the daily loading of one track averaged  $\frac{2}{3} \times 3,000 = 1,800$  axles, or  $1,800 \times 340 =$  (say) 610,000 axles a year. On some roads the annual loading reaches 1,200,000 axles, but the average of 610,000 axles was adopted for the present tests, corresponding to from 6.1 to 9.25-million applications of load for durability tests representing 10 to 15 years' service.

Most of the tests were made without ballast but two sleepers were tested in conjunction with ballast when investigating the disintegration of the latter in service. The new permanent way construction "K" of the State Railway was adopted and the behaviour of four kinds of sleepers was examined, viz.: Unplugged pine sleepers; pine sleepers with knock-in and screwed plugs respectively; and beech sleepers without plugs. Load was applied to two test assemblies simultaneously by means of a cross rail under the head of the testing machine; this rail bore directly on the test rails for vertical loading, but through an inclined block applying the resultant of 1:4 horizontal: vertical loading in other cases. Each 60 cm. (23½ in.) length of sleeper rested on strips of sheet iron 6 cm. (2½ in.) wide, carried by two steel rollers 50 cm. (19½ in.) apart, corresponding to the theoretical centres of pressure of sleepers in ballast.

The stress in the holding-down screws, and therefore their holding force, was determined by a calibrated device consisting of an indicating gauge connected to a wire participating in the extension of the drilled screw. The observed extensions of the screws during the tests were

referred to the initial extensions produced by a tightening torque of 35 m.kg. (223 ft. lb.) Gauge marks were provided to permit measurements of the depression of the centre of the soleplate with regard to the top of the sleeper; also, the transverse displacement of the soleplate in the case of combined vertical and horizontal loading.

Tests were made corresponding to speeds of 125 km. (77.7 miles) an hour and 12 km. (7.5 miles) per hour as extreme cases; also, since the elastic properties of the material are unable completely to follow the rapid changes of load at 125 km. (77.7 miles) an hour, tests were also made at 95 km. (59.0 miles) an hour. Assuming a distance of 4.5 metres (14 ft. 9½ in.) between axles, the frequency of loading in the three series of tests and the constructions used in each case, were as follow:

Test No. 1—125 km. (77.7 miles)/hr.—466 applications of load per min. Unplugged beech sleepers; and pine sleepers with knock-in plugs. No ballast.

Test No. 2—95 km. (59.0 miles)/hr.—350 applications of load per min. Pine sleepers, unplugged and with screwed plugs. No ballast.

Test No. 3—12 km. (7.5 miles)/hr.—43 applications of load per min. Pine sleepers with knock-in and with screwed plugs. Tested with ballast.

All coach screws were tightened by the application of the same torque, 35 m.kg. or 253 ft. lb., that having been found by earlier tests to be the maximum permissible for the softest sleepers. The total force exerted by the four screws was the same for each test assembly, viz. 8,000 kg. (17,637 lb.), the maximum attainable without overstressing the least favourable timber. This did not fully utilise the strength of beech sleepers but uniformity of initial conditions was essential to the obtaining of comparative data on slackening. After being assembled the specimens were stored for 8 to 14 days in order to exclude from the durability test the initial relaxation of holding force which occurs automatically. Constant atmospheric temperature was maintained throughout the tests and water used to moisten the sleepers was at the same temperature. Preliminary tests having shown that the grip between plug and sleeper (and not between screw and plug) determines the effective strength of screwed connections to plugged sleepers, the top of the plug was undercut slightly to ensure that the load on the plug and sleeper connection was the full tension in the screw.

In each test the load on the specimen was alternately increased to 4,200 kg. (9,259 lb.) and reduced to 250 kg. (551 lb.). At regular intervals—at first 500,000 and later 1,000,000 changes of load—the load was reduced to 42.5 kg. (93.7 lb.), i.e. half the weight of the cross rail, the indicating gauges were read and the corresponding screw forces calculated, and readings were taken of the permanent depression and lateral displacement (if any) of the soleplate. These readings were repeated with a static load of 4,200 kg. (9,259 lb.) before resuming dynamic loading.

The effects of rain were imitated in different ways, viz.: Test No. 1.—After 11,500,000 applications of load, the specimens were submerged in water for 17 hr., and then kept wet throughout 3 days' dynamic loading, bringing the total number of applications of load up to 13,400,000. The specimens were then dried for 2 days at 45° C. (113° F.), corresponding to maximum sun heat, and dynamic testing was resumed until a total of 15,000,000 applications had been made. It should be noted

that the sleepers contained much moisture after the 2 days' drying. *Test No. 2.*—The sleepers were regularly sprinkled after 5,000,000 changes of load, without interrupting the cyclic loading. This test was stopped after 7,600,000 applications of load, the forces in the screws then showing no considerable change in tendency. *Test No. 3.*—The ballast was moistened regularly between 1,300,000 and 1,800,000 applications of load, and again between 2,300,000 and 2,800,000 applications. The sleepers were not wetted directly but absorbed moisture from the ballast. This test was stopped after 3,300,000 applications of load including 800,000 in preliminary testing.

### Results of Tests

The measured values of the holding-down forces in the four coach screws of each test assembly differ considerably owing to variations in the structure of the wood and

In all cases, the application of moisture resulted in a marked increase in the holding-down forces. The subsequent partial drying in *Test No. 1* caused only a moderate reduction in force (see Fig. 1) because the wood still contained much moisture. The swelling of the wood with moisture increases the pull in the screws; and the shrinkage consequent upon drying reduces the pull.

Each application of load reduces the force in the screw by 20 to 30 per cent., compared with the force in the screw when the track is unloaded. The repetition of this change in force causes fatigue or permanent deformation of the wood (sleeper or plug) with which the screw threads engage, and this accounts for the gradual slackening of the holding force so long as there is no addition of moisture. It must also be remembered that the screw is somewhat relieved, at each application of rail load, by the depression of the soleplate into the sleeper. The greater

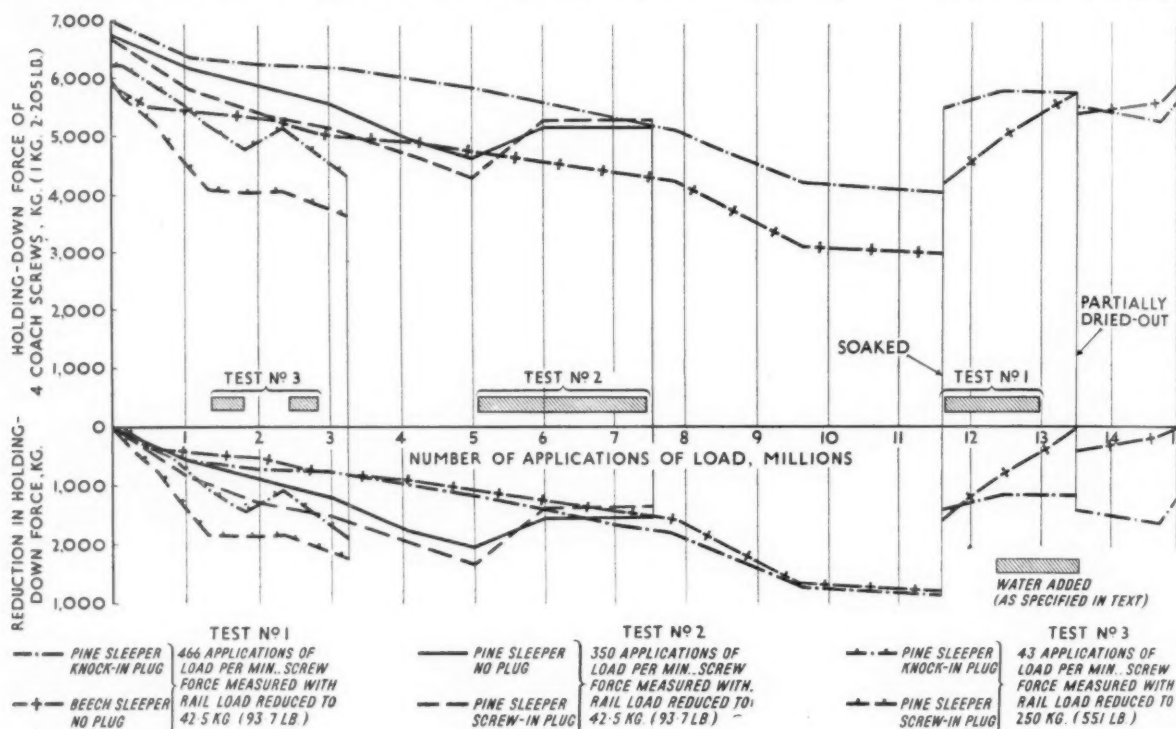


Fig. 1—Total holding-down force exerted by four coach screws and (below) the decrease in this force as a function of the number of applications of rail load

stresses in the soleplate, but the general trend is the same for all the screws in each set. For purposes of comparison it is therefore convenient to plot the total force in each set of four screws against the number of applications of load. This is done in the accompanying diagram, Fig. 1, which shows also the decrease in holding force referred to the value at the commencement of dynamic loading.\* These curves are based on readings taken when the applied load was reduced to 42.5 kg. (93.7 lb.) or 250 kg. (551 lb.) as stated below the diagram; curves showing the force in the screws as measured with a static load of 4,200 kg. (9,259 lb.) on the rail follow the same course but at about 1,000-2,000 kg. (2,205-4,410 lb.) lower values.

\* As already noted the assemblies were tightened to the same extent and then allowed to stand until the forces in the screws settled to a steady value. As a consequence, the total force in the four screws at the commencement of dynamic loading was less than 8,000 kg. (17,637 lb.) in all cases, see Fig. 1.

central deflection of the soleplate results in an upward component against the outer edges of the screw heads (away from the rail). This eccentric loading of the screw head produces a horizontal force which gradually moves the screw sideways (away from the rail) until it reaches the outer side of the clearance hole in the soleplate, the holding-down force in the screw meanwhile decreasing owing to the loosened grip of the threads.

The depression of the soleplate into the sleeper, to the extent of 0.2-0.3 mm. (0.008-0.011 in.) by a rail load of 4,200 kg. (9,259 lb.) results in a reduction of the tension in the screws which is restored directly the load is removed, provided that the depression is elastic. Any permanent depression of the soleplate in the sleeper causes a corresponding permanent reduction in the holding-down force of the screws, and its effect is the more marked the better the screws maintain their grip in the wood.

The observed transverse displacement of the soleplate in

Tests Nos. 1 and 2 was only 0.08 to 0.15 mm. (0.003-0.006 in.) and did not consist in slipping of the plate but in elastic stretching of the sleeper. Clearance between the screws and the walls of the holes in the plates affords an opportunity for transverse movement, but generally no trouble arises from this cause if the soleplate be stiff and the force exerted by the screws sufficient to hold it firmly on the sleeper.

### Effect of Speed

A comparison between the results of the several tests with pine sleepers shows the great importance of speed as regards the permanent sinking of the soleplate in the sleeper. The same number of applications of load, *viz.* 3,300,000 (corresponding to 5 or 6 years' service), produced only 0.08 mm. (0.003 in.) permanent depression of the soleplate in the sleeper in Test No. 1, compared with 0.18 mm. (0.007 in.) in Test No. 2, and 0.61 mm. (0.024 in.) in Test No. 3, the explanation lying in the different frequencies of load application (466, 350, and 43 per min. respectively). In Fig. 2, the permanent depression of the soleplate for 3,300,000 applications of load is shown as

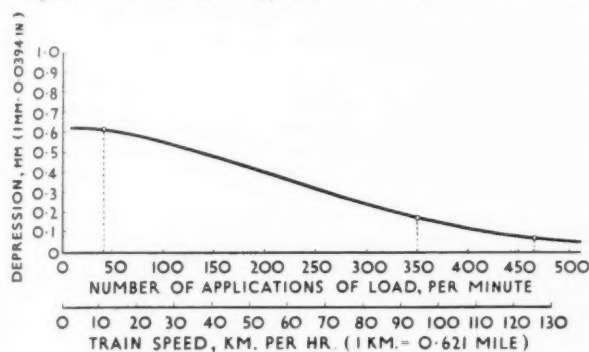


Fig. 2—Permanent depression of sole plate in pine sleeper after 3,300,000 applications of load (equivalent to about 5 years' service) as a function of the number of applications of load per minute and the corresponding train speeds

a function of the applications per minute and the corresponding train speeds. The curve becomes asymptotic at high speeds, the wood then being unable to follow the load variations. At low speeds, however, the wood goes through each cycle of compression and experiences considerable permanent depression by fatigue. The author has found confirmation of this in the comparatively rapid sinking of soleplates into new sleepers on port railways, these offering a better criterion of the effects of low speed than can be obtained in sidings laid with old material.

The present tests enable the effects of speed to be examined independently of variations in load, the applied load being the same in all cases. In practice, the heavily loaded roads generally carry about 5 times as many axles at goods train speeds, say 45 km. (28 miles) an hour, as at passenger train speeds of 60 to 80 km. (37.3-49.7 miles) an hour. The bulk of the traffic being 40 to 50 km. (28-31 miles) an hour, the soleplate soon beds into the sleeper as would be expected from Fig. 2.

### Weathering

From the curves in Fig. 1 it would appear that the screws retain sufficient holding force to make tightening unnecessary during 10 to 15 years' service. Actually, tightening is generally necessary after 3 or 4 years' service owing, no doubt, to the weathering and time factor which cannot be adequately taken into account by ac-

celerated tests. The increased holding force found to result from the swelling of wet wood in the laboratory tests is favourable as regards the clamping of the soleplate to the sleeper, but very detrimental to the structure and strength of the wood. The strength of wood is approximately halved by saturation with water so that in practice over-stressing of the wood must result from moisture, and the more rapidly the greater the initial forces between the screws and the dry wood.

Water cannot easily reach the screws from the sides of the sleeper. Anything which prevents moisture from entering the screwhole vertically should therefore be of direct assistance to economical maintenance. Well-drained ballast reduces the opportunities for water to enter from the bottom. Flexible soleplates exert a pumping action, forcing water into the screwholes, and should therefore be avoided. Rigid cast iron chairs or soleplates as used on English and Dutch railways ensure good and uniform clamping on the sleeper and make it difficult for water to reach the borehole. French track, laid without soleplates, is also little exposed to the danger of water penetration, whereas a thin soleplate forces water into the hole from all directions.

The difference between laboratory tests and service conditions in respect to weathering is clearly shown by comparing sections of sleepers which have been from 6 to 18 years in service with sections of specimens subjected to an equal or even greater number of applications of load in accelerated tests. The service sleepers show more or less deterioration of threads in the wood, while the laboratory specimens still show perfectly defined threads, possibly enlarged somewhat by fatigue but free from wasting and decay, and with no appreciable deterioration of the screw by rusting.

Two of the most striking points brought out by the comparison between service and test sleepers are the advantage of plugging the screwholes, and the superiority of the knock-in compared with the screw-in plug. In all cases the form of the thread engaging with the screw is much better preserved in plugged than in unplugged holes, and where impregnated knock-in plugs are used the combined effect of the preservative and of the spreading (compressive) action of the screw is to produce a virtually moisture-tight, decay-proof and mechanically strong connecting layer between the screw and the body of the sleeper. In such cases, the screw thread inside the plug after 6 years' service,\* with about 420,000 applications of load per annum, was in practically as good condition as that in the laboratory test specimens. Unplugged holes show more or less complete destruction of thread even where the impregnation of the sleeper has prevented rotting. The deterioration is not attributable primarily to decay but to the sluicing action of water forced into wood weakened by moisture and consequently over-stressed. In so far as this action removes the preservative material, decay may ensue.

**DISUSED SHREWSBURY RAILWAY LINE.**—On Monday the Shrewsbury Town Council resolved to accept an offer from the Shropshire & Montgomeryshire Railway to sell for £778 the disused branch railway line which runs through a portion of the town at Abbey Foregate and joins up with the L.M.S.R. and G.W.R. joint line to Wellington. It was stated that the purchase would, on the one hand, relieve the Shropshire & Montgomeryshire Railway Company of certain street repair liabilities, and on the other enable the Town Council to develop the site.

\* The knock-in plug was only introduced after the war and no example was obtainable with more than 6 years' service.



## THE IRAQ RAILWAYS

*In view of the transfer of this system to the Iraqi Government and of its war-time origin, the following is a brief history of it, divided into two parts, (1) the war period and (2) the post-war period*

THE terms of the agreement dated March 31, 1936, regarding the railway system of Iraq, between the Governments of the United Kingdom and of Iraq including the transfer of the railways to the latter, have just been published in the form of a Government White Paper: Iraq No. 1 (1936). Though this agreement has not yet been ratified, there is no reason to suppose that ratification will not follow in due course, and the present time is therefore appropriate for a brief review of railway development in Iraq. Broadly the story falls naturally into two parts, namely, construction during the war period, and civil development since 1920, under British ownership, but with increasing Iraqisation. This has now culminated in the transfer as from April 1 of actual ownership to the Iraqi Government, but subject to various conditions summarised at the end of this article.

### PART I.—THE WAR PERIOD

The first railway to be constructed in Iraq—or Mesopotamia as it was then called—was the 4 ft. 8½ in. gauge German-built Baghdad-Samarrā section of "The Baghdad Railway." This was completed in 1915 and, when the Turks retreated, it fell into British hands in the spring of 1917. Meanwhile the construction of both the Basra-Nasiriyah (140 miles) and the Qurna-Amara (70 miles) lines had been begun in 1916 by the Railway Directorate of the British Expeditionary Force. The former was, and still is, of metre gauge and—with the exception of the last five miles, now the Ur-Nasiriyah branch—is part of the Basra-Baghdad main line. At the time of its construction, it was anticipated that the Basra-Nasiriyah line would eventually link up with the 4 ft. 8½ in. gauge Baghdad Railway, and it was therefore laid with 75-lb. rails, so spiked to standard gauge sleepers that only one rail would have to be removed outwards to convert the line from metre to standard gauge. The Qurna-Amara section was originally built to 2 ft. 6 in. gauge but was subsequently converted to metre gauge.

### Reasons for Different Gauges

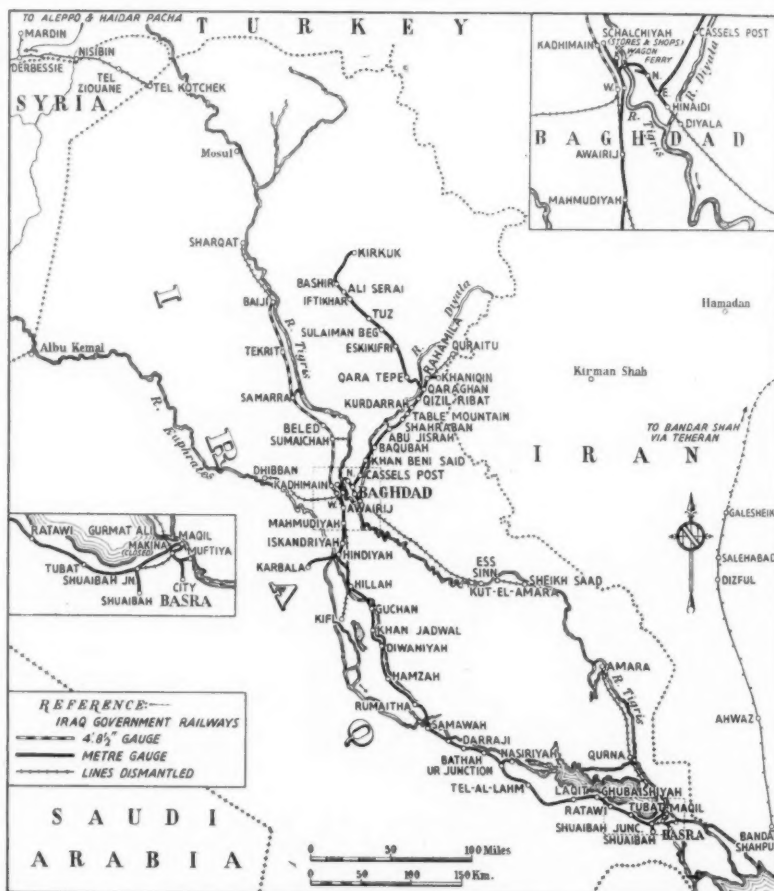
It may here be explained that the difficulties which faced the Director of Railways in deciding the gauges of the various lines, were the result of his never knowing from month to month what engines and rolling stock would be sent to him. Nearly all this stock came from India, where there were 5 ft. 6 in., metre, 2 ft. 6 in., and 2 ft. 0 in. gauges, and its release by the various Indian railways was piecemeal according as it could best be spared. It was only later that metre gauge was standardised as the material to be sent to Mesopotamia. As well as rolling stock, many hundreds of miles of permanent way were supplied by India, where numerous lines were pulled up to meet the war demand.

The Director of Railways and the bulk of his large staff of all grades also came from India. Construction was carried out by Railway Companies of Sappers and Miners, and by Railway Construction Companies specially recruited and trained in India; earthwork was also done by labour corps, which were nearly all Indian. Operating and maintenance staff was also mainly Indian.

### The Tigris Lines

The main lines of communication of the expeditionary force, water and rail, followed the Tigris. This river is very tortuous and difficult to navigate, and although a large fleet of steamers was used, transport was slow, and the early construction of the Qurna-Amara railway was necessary to supplement the river transport. So heavy became the traffic, however, that not only was the conversion of this section of line—to metre gauge—necessary before the end of 1916, but a line from Basra to Qurna also became essential, and was completed on January 1, 1918.

The principal feature of the latter connection was the bridge over the so-called new channel of the Euphrates at Gurmat Ali, this channel being 60 ft.-70 ft. deep. The



Sketch map of the railways of Iraq and adjacent systems, showing also the alignments of various abandoned war lines

pile type of bridge, so successful elsewhere in Mesopotamia, could not therefore be used, and consequently a floating bridge, designed to carry metre gauge loads and some 420 ft. in length had to be transported from India and installed. This bridge with its variations of level due to the rise and fall in the river and to fluctuating loads, was fitted with special raising and lowering gear, and had to be watched constantly. Though it gave considerable trouble, it served its purpose very well. The old Euphrates had also to be bridged at Qurna by a 900-ft. pile structure. Both these sections of line have been dismantled since the war, as has the Kut-Baghdad line, which, forming another link in the Tigris "l. of c.," was constructed in 1917 to 2 ft. 6 in., and in 1918 was converted to metre gauge.

The length of this line was just half the distance by river between Kut-el-Amara and Baghdad and its completion enabled about 36 hours to be saved on the upstream river journey. It ran into Hinaidi and afterwards Baghdad East, and finally Baghdad North, on the left bank of the Tigris. There was, and still is, no rail connection across that river between Baghdad West and Baghdad North, though there is now a wagon ferry linking up the systems east and west of the Tigris.

#### Lines North-East and North of Baghdad

Meanwhile in May, 1917, work was begun on the metre gauge extension beyond Baghdad East to Baqubah, Table Mountain, and Khaniqin near the Persian frontier, whence a road runs to Kirmanshah and Hamadan. It is probable that the east-to-west trans-Iranian (Persian) railway referred to in THE RAILWAY GAZETTE of July 26, 1935, will follow this road and terminate near Khaniqin, where there will be a break of gauge. As it may eventually link up with the Quetta-Duzdap branch of the Indian North Western Railway, there will then be through rail connection between Baghdad and India.

The Table Mountain section completed in June, 1918, entailed heavy engineering works, including two tunnels, in the course of its climb from the plains to the foothills. The only other engineering feature was the Diyala River bridge at Baqubah, built originally as a pile structure, but rebuilt on well foundations and with four girder spans each of 100 ft. in 1918. The Khaniqin end of the line was extended and improved in 1922, and the present Khaniqin terminus is 109 miles from Baghdad North at Khaniqin City.

An important branch leaving this line at Qaraghan (between Table Mountain and Khaniqin), and running to Kingerban was extended 53 miles to Kirkuk (108 miles in all) in 1925-26. Kirkuk is 200 miles from Baghdad North and is only about 100 miles from Mosul, which was the original objective of this metre gauge line. It will therefore be seen that of the metre gauge system up, and east of the Tigris, the Khaniqin and Kirkuk lines from Baghdad now alone remain, and are linked with Basra only by the wagon ferry, which, however, is shortly to be replaced by a bridge.

#### Lines Radiating from Baghdad West

By the end of 1917, another branch line had been run out from Baghdad West to Falujah on the Upper Euphrates, and after the complete rout of the Turks at the battle of Ramadie, this line was extended to Dhibban, 48½ miles from Baghdad West in February, 1918: it has, however, subsequently been dismantled.

The Baghdad West—Hillah section was completed in May, 1918, and was constructed to 4 ft. 8½ in. gauge in extension of the Samarra—Baghdad West line southwards. Later in that year, however, when it had been decided to link up Ur with Hillah, thus forming a through Basra-

Baghdad West metre gauge connection, this section was converted to that gauge. In September, 1918 also, the extension of the Samarra line northwards was completed to Tekrit, the standard gauge being retained for the extension, which was eventually carried on farther northwards to Sharqat (Shergat) situated 186 miles from Baghdad West, and approximately 60 miles south of Mosul. The last 54 miles of this line have, however, been dismantled, the terminus now being at Baiji, the nearest standard gauge railhead south of Mosul and 132 miles from Baghdad West.

#### Final Link in Basra-Baghdad Railway

With the exception of brief mention of some of the smaller lines such as Hindiyah-Karbala, the Shuaibah and Basra City branches in the Basra area, this brings us to the final link in the Basra-Baghdad main line between Ur and Hillah. It was begun in 1918 with a 30-mile dead straight alignment, set out from each end by sighting on to columns of smoke long distances ahead, an approximate but one of the few methods of surveying four or five miles a day through desert "shimmer."

Beyond Samawah, the line, as originally surveyed and partly constructed, crossed two arms of the Euphrates on pile bridges, both of which were built, but almost at once dismantled with the remainder of this tentative extension, owing to its traversing low-lying land subjected to heavy flooding over long distances. It was replaced in 1919 by the final line which still exists and crosses the Euphrates by a single bridge just above Samawah: it then makes for a relatively higher ridge of country leading to Rumaitha and thence via Diwaniyah to Hillah. It may be of interest to note that the realignment was selected mainly as a result of a bird's eye view from the top of a tall pile-driver when the whole country except the above ridge was under a sea of flood water, stretching as far as the eye could see. The distance by this the present main line from Basra (Maqil) to Baghdad is 353 miles.

Iraq therefore relies for its rail communications upon those military lines that were subsequently retained as being indispensable either from the civil administrative or the commercial point of view. Naturally they have been improved, especially in respect of the larger bridges, in which the rapidly-driven timber piles carrying relatively short girder spans have been replaced by well foundations and brick piers supporting longer spans.

#### War Time Rolling Stock

Before turning to the post-war period, a note or two on the rolling stock that found its way to the military railways in Mesopotamia may be of interest. Apart from some ambulance trains that were constructed in India, worked to an Indian port on 5 ft. 6 in. gauge bogies, shipped to Baghdad and there mounted on 4 ft. 8½ in. bogies for the Samarra line, all the locomotives and stock commandeered from India was metre or narrow gauge. To supplement the German standard gauge engines which the Turk, in his retreat, failed to damage beyond repair, a few British 0-6-0 tender engines also went to the Samarra section.

But the great bulk of the locomotive, carriage and wagon stock came from the various Indian metre gauge lines, and formed a motley collection to look at, though, thanks to standardisation in that country, it was in reality almost all interchangeable. The most striking exception to this rule was the receipt at Basra in 1918-19 of some metre gauge Mallet compounds of the 0-6-0 + 0-6-0 wheel arrangement. They were American-built to, it was said, Russian specification and inspection, as they were reported

to have been destined originally for the Archangel 3 ft. 6 in. gauge line, and subsequently converted to metre gauge. At any rate, this proved an unhappy combination, for the engines began to go to pieces within a few months of being placed in service on the Basra-Nasiriyah line. Whole sets of motion were shed on the road and the boilers gave out in an alarming fashion.

## PART II.—THE POST-WAR PERIOD

### The Financial Position after De-militarisation

ON April 1, 1920, the railways were absorbed by the civil Government of Mesopotamia, which by then had taken definite shape under the administration of Sir Arnold T. Wilson, the Acting Civil Commissioner. Three months later the Euphrates Arabs arose in revolt, and besides minor damages elsewhere on the system, 160 miles of main line between Ur, the home of Abraham, and Babylon, the city of Nebuchadnezzar, was destroyed. The cost of reconditioning the system was extremely heavy, and included the rebuilding of the Euphrates bridge at Samawa as a *pukka* structure. The railway accounts for its first two "civilian" years revealed deficits amounting to £800,000. This charge against the Imperial Exchequer must be viewed as a contingent liability of the war having no bearing on the civil status of the railway. Better times were to come; in the third year the railway showed an excess of earnings over expenditure, and £26,000 were duly credited to the British Treasury, which, however, had spent £890,000 on capital works during the three years. An official valuation made in 1922 assessed the British interest (exclusive of stores) at £3,410,000, which some years later was reduced to £1,875,000. For the past thirteen years the British taxpayer has not been called upon to meet any further charges; in fact the Treasury has received from railway funds sundry payments including £170,000 for stores and certain instalments in part settlement of a debt on current account. This process of debt collection ceased when its balance (£185,820) was capitalised (at £187,500) by the terms annexed to the Anglo-Iraq Treaty of Alliance (1930).

### 1924 Agreement between the Two Governments

Under the terms of the Financial Agreement of March 25, 1924, between the two Governments, the railway remained the property of the British, but the responsibility of its administration devolved on the Iraqi Government (with effect from April 1, 1923). Railway finances were excluded from Government accounts and treated as water-tight, and the British Government had a supervising control over expenditure and protected the rights of British and British Indian staff; the transfer of responsibility to Iraq was therefore considerably restricted. Neither Government, however, would accept formal responsibility for any deficit in railway working. This joint negation planted, perhaps unwittingly, the feet of railway management in the realms of reality. Faced with this anomaly the Railway Directorate accepted the challenge and from that day to this has been self-supporting.

### Rehabilitation and Iraquisation

Down the years that followed, assisted only by loans—from the Iraqi Government (totalling £355,800, of which £11,925 were repaid) and from the Anglo-Persian Oil Co. Ltd. (£57,000, all repaid)—the railway management continued to set its house in order. *Pukka* had already ousted *kutchra*, make-shift was giving place to permanence, and so gradually realignment marched with betterments, economic expansion and efficiency grew with experience,

and administrative reforms followed on financial reorganisations. Workshops were brought up to date, rolling stock was reconditioned, and new stock erected; the whole system was relaid, all temporary bridges were replaced, new extensions built, and uneconomic sections pulled up. All the while imported staff was being gradually replaced by Iraqi, which now represents 97 per cent. of the total staff as against 54 per cent. in 1922. This brief tale of achievement is clearly reflected in figures. By March 31, 1935, the railway, out of its own resources, had financed capital expenditure (since April 1, 1923) to the extent of £309,185. The floating assets on March 31, 1935, were made up of cash £348,186, stores and works in progress £124,803, and sundry debtors £65,212, and the liabilities (excluding those to the two Governments) comprised sundry creditors £55,320 and a reserve of £324,729, of which £211,301 was earmarked for renewals and replacements.

### Beneficial Ownership Vested in an Anglo-Iraqi Board Proposed in 1930

While the practical side of the railway was thus being actively and successfully exploited, dust was falling on its peculiar and theoretical status; it was not until 1930 that any determined effort was made to settle the problem. Sir Francis H. Humphrys, during his first year of office as the last High Commissioner in Iraq, negotiated the Anglo-Iraq Treaty of Alliance (1930) annexed to which was an exchange of Notes; one, dated August 19, 1930, provided terms for the settlement of the railway question. It made provision for the transfer of legal ownership to Iraq, with full beneficial ownership vested in a board or corporation to be constituted by a special statute of the Iraqi Legislature, on terms to be mutually agreed. Britain's financial interest in the railway was to be represented by £2,062,500 6 per cent. non-cumulative preferred shares, while Iraq's loans (£343,875) were to be likewise preferred. The personnel of the board was to consist of three British and two Iraqi directors, and Iraq had the right to buy out Britain's interest at par. The board was to be formed within one year after Iraq entered the League of Nations; but though Iraq became independent in October, 1932, the Railway Board never materialised. It may be inferred that difficulty was experienced in giving shape to the fine distinction of "ownership" implied in this facile diplomatic formula.

### The 1936 Agreement

The agreement now reached was briefly announced and outlined on page 654 in our issue of April 3 last, but the following is a fuller précis of its contents:—

Article 1 rules that all rights in respect of ownership shall be transferred by the British to the Iraqi Government (1) as soon as the former shall have received from the latter the sum of £400,000 sterling payable within 20 days of the entry into force of the agreement and (2) the Board of Management provided for in Art. 2 has been duly constituted.

Art. 2.—The King of Iraq undertakes that for 20 years from the date of transfer the management of the railways shall be entrusted to a Board of Management appointed by the Iraqi Government. It is to consist of five members: a Minister of State, as President; the General Manager; and three others appointed by the Iraqi Government, one of whom shall be a British subject. The board shall take over the management as from the date of transfer.

Art. 3.—The board shall be invested by legislation with adequate powers of control and administration throughout the 20-year period, and the railway budget shall be annexed to the general budget for the same period.

Art. 4.—For a period of 20 years from the date of transfer the following posts on the railway shall be filled by British subjects on equitable conditions of service: General Manager, Inspector-General of Traffic, Chief Engineer, Assistant to the Chief Engineer, Chief Mechanical Engineer, and Assistant to the Chief Mechanical Engineer.

Art. 5.—Provides for the acceptance of various liabilities



by the Iraqi Government and cancels certain terms in the Alliance of August 19, 1930, referred to above.

Art. 6.—Deals with ratification.

The Iraqi Government has also agreed to the following supplementary conditions:—

(a) For a period of five years the Inspector-General of Traffic shall perform the duties of Traffic Manager; (b) the Chief Auditor for a period of 10 years shall be a British subject; (c) for a period of five years British District Engineers shall be employed; and (d) if the Iraqi Government wishes to employ non-Iraqi personnel other than those specified in Art. 4, it shall normally engage British subjects. Non-British subjects may, however, be engaged for posts for which suitable British subjects are not available. (See personal postings on page 955).

#### True Value of the Assessment and Liabilities

Actually, the cash value of the railway to Great Britain is the amount which the Iraqi Government is prepared to pay for it. That is apparently £400,000, but in addition to this factor there are many other important aspects of the question requiring consideration. For instance, the railway has never been able, and is not likely for some long time to make any adequate return on its capital (for many years no interest has been paid on the Iraqi Government loans). Then again, since Iran opened its port, Bandar Shahpur, at the head of the Persian Gulf, the transit trade of Iraq, and consequently railway earnings, have suffered. Moreover, though earnings during the past few years have been enriched by the carriage of construction materials for the I.P.C. trans-desert pipe line, this is now complete; also there has been an appreciable traffic in transit cased oils to North Iran from the oilfields in South Iran, a traffic which ceases, or has already ceased, with the completion of an oil refinery in Mid-Iran.

Another pertinent matter is that the railway communications of Iraq fall far short of its commercial and strategical requirements. But the cost of completing and developing the system—exclusive of any railway concession granted to the British Oil Development Company—would be little short of £2,000,000, more than half of

which sum would be expended on a 104-mile extension from Kirkuk to Mosul and a railway bridge across the Tigris at Baghdad. The service of a loan of this proportion, even with increased earnings, would probably tax railway surplus revenues to extinction. A further £3,000,000 would be required for the construction of the proposed 357-mile length of the Haifa-Baghdad Railway which would fall in Iraq territory, should that project be accepted as vital to the commercial interests of Iraq. It is idle to pretend that the traffic prospects of this trans-desert railway for many years to come would be sufficient to relieve the Iraqi Government of charges which would arise concomitantly with its existence.

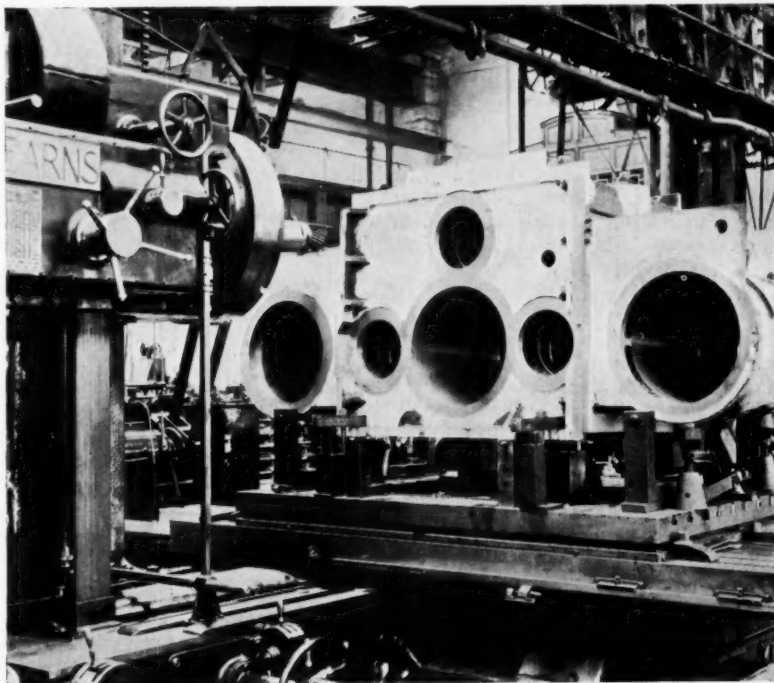
Incidentally, attention may be called to the fact that Great Britain will, presumably, retain the right to use the railway for the conveyance of military forces and supplies until 1957, as was provided for in the 1930 agreement. Moreover, orders for railway material for new construction (and maintenance) will probably arise, from which Great Britain should benefit. It is also possible that the figure agreed upon may have been fixed after taking into account the financial matters outstanding between the two Governments, such as the cost of the settlement of the Assyrians. Finally, item 3 of the new agreement relieves the British Government of all liabilities in connection with railways in Iraq. This may have some bearing on potential claims in connection with the taking over of the old German Baghdad Railway.

All things considered, therefore, this small cash payment is not so favourable to Iraq as might at first appear, and her liabilities as owner will undoubtedly be onerous. In any case, the long delayed settlement of the question has the twofold merit of relieving, with cash, the British Government of an embarrassment of paper, and, while satisfying the national *amour propre*, of Iraq, will enable her Government to go ahead, free and unfettered, with the country's much needed railway development.

### Boring Locomotive Cylinder Castings at Darlington Works, L.N.E.R.

THE accompanying illustration shows a Kearns patent horizontal machine for boring, &c., recently installed at the Darlington works of the London & North Eastern Railway for locomotive cylinder work. The machine is capable of performing all machining operations on cylinder castings. These include boring three cylinders, bell mouths, stuffing boxes, and piston valve liners, radiusing and facing at front and back, forming clearances at the bottom of the barrels, milling the frame faces, and drilling and milling ribs and boxes. The three-cylinder casting illustrated is machined complete in 46 hours, this time including two settings.

The cylinder castings shown in the illustration are for the North Eastern Area Atlantic engines which were designed by the late Sir Vincent Raven. The design of the cylinder castings for all his three-cylinder engines is the same, and it will be noted that all three steam chests are inside.



Cylinder casting mounted in position for boring

## A KOWLOON-CANTON RAILWAY BUFFET CAR

*This vehicle, which seats forty passengers in the ordinary portion and sixteen more in the buffet, provides a through service between Kowloon and Sheung Shui*



SINCE February 15 a buffet car has been in service on the Kowloon-Canton Railway between Kowloon and Sheung Shui. On Saturdays, Sundays and Wednesdays, the car is attached to the 12.35 p.m. express to Canton, and is slipped at Fanling. On Mondays, Tuesdays, Thursdays, and Fridays, it is attached to the 12 noon local train. The car returns to Kowloon every day on the 5.44 p.m. train from Shum Chun.

The car was converted from a steel-bodied first class dining car by rebuilding the kitchen and pantry portion as a buffet bar. The ordinary part of the car seats 40 passengers, and the buffet portion 16. The bar seats seven persons on revolving seats, and the corner lounge seats accommodate nine more. The buffet portion is panelled in imitation old oak. Special cooling arrangements have been provided, and the roof has been lowered to give an 18-in. air space. The ceiling consists of light brown mottled Jointex wall board supplied by the Swedish Trading Company, Hong Kong. Ventilation is by three Airvac ventilators supplied by the Airvac Co. Ltd., and three Thermotank Punkah Louvres, in which the outside air is filtered before being forced into the compartment by a rotary blower.

Refrigeration of drinks is effected by a Ward refrigerator supplied by the Dairy Farm, Ice and Cold Storage Co. Ltd., Hong Kong. The serving of hot drinks is made possible by the storage of high-pressure gas from the Hong Kong & China Gas Company's mains. Diffused lighting is provided, with lamps by J. Stone & Co. Ltd., Deptford. Flooring is linoleum, as originally supplied for this coach through Jardine, Matheson Limited, and covered with Mastipave purchased from the local Agents, Bradley & Company.

The bar, which is 14 ft. 9 in. long, is constructed of teakwood and is of the conventional type with a brass rail; the wood is stained to match the general colouring of the interior. Behind it are fitted a lead-lined sink, receptacles for drinks and refrigerator, and a gas ring. The gas supply, drawn from a tank underneath, will give continuous burning for 3½ hr.

The attractiveness of the bar is heightened by a series of four coloured hunting prints by Young. These were obtained from Arts & Crafts Limited, Hong Kong, and

represent "The Meet," "Gone Away," "Full Cry," and "The Death." The car is equipped for slip coach working when required. The whole of the work has been carried out in the railway workshops at Hung Hom.



View in bar, showing seating arrangements and sporting prints on walls

## NEW 2-8-2 LOCOMOTIVES FOR CHINA

*One of a series of six superheated two-cylinder engines recently built by Henschel & Sohn A.G., Kassel, for the Chekiang-Kiangsi Railway Company*



THE accompanying illustration shows one of a series of six superheated, two-cylinder, 2-8-2 type locomotives built for the standard gauge Chekiang-Kiangsi Railway by Henschel & Sohn A.G., Kassel. They are intended for hauling goods and passenger trains on the Yushan-Nanchang section. These engines were delivered early this year, and already an order for eight more of the same type has been received by Henschel, as recorded in our Contracts and Tenders column last week.

The heating surface includes 41 tubes of 51 mm. (2.008 in.) diameter outside and 101 flues of 89 mm. (3.504 in.) diameter, and 4,900 mm. (16 ft. 0 $\frac{7}{8}$  in.) in length between tube plates, which provide with the firebox a heating surface of 177.4 sq. m. (1,909.5 sq. ft.) on the fire side. The heating surface of the superheater on the fire side is 88.2 sq. m. (949.4 sq. ft.), making a total heating surface of 265.6 sq. m. (2,858.9 sq. ft.).

The total length of engine and tender, over buffers, is 21,675 mm. (71 ft. 1 in.), and the maximum axle load 16,270 kg. (16 tons). The weight of the engine empty is 81,540 kg. (80 tons 5 cwt.). The wheelbase of the eight-wheeled tender is 6,200 mm. (20 ft. 4 in.), and the weight of the tender empty 25,000 kg. (24 tons 12 cwt.). The total wheelbase of engine and tender is 18,900 mm. (62 ft. 0 $\frac{1}{8}$  in.). The maximum speed for which the engine is designed is 72 km.p.h. (44.7 m.p.h.), and the minimum radius of curve that can be traversed is 183 metres (600 ft.).

As regards the general features of construction, the locomotive has bar frames, steel firebox with water-circulating tubes in the combustion chamber, Franklin No. 8 firedoor, steam-operated shaking grate, type E superheater with multiple valve regulator by the Schmidt Heissdampf Gesellschaft, Hancock water column and water gauges, Ross safety valves, Parry tube cleaner, scum cock, top feed boiler check valve, and two non-lifting Strube injectors. Lambert sanding gear is fitted, also a Hasler speedometer, full size and  $\frac{3}{4}$  size coupler on the tender, compressed air bell, low water alarm, and Westinghouse 6ET compressed air brake. There are two cylinders, placed outside the frames and steam distribution is effected by Heusinger valve gear with steam-oil

control, type S.A.R., Huhn piston rod stuffing boxes, special crossheads and slides with large crosshead bearing area, and connecting rods with floating bushes in the big ends. Tecalemit high-pressure grease lubrication is used for the motion work, valve gear, brake rods, and other parts, grease lubricating pads for the axleboxes of the coupled wheels, and Peyinghaus self-lubricating oil axleboxes for the trailing bissel of the locomotive and the tender bogies. Electric lighting current is provided by a Stone's a.c. generator, and Westinghouse steam heating is fitted.

The leading dimensions are as follow:—

Cylinders, dia. . . . .	508 mm. (20 in.)
" stroke . . . . .	660 " (26 " )
Coupled wheels, dia. . . . .	1,372 " (4 ft. 6 in.)
Leading bissel wheels, dia. . . . .	860 " (2 " 10 in.)
Trailing bissel wheels, dia. . . . .	1,000 " (3 " 3 $\frac{1}{2}$ " )
Tender wheels, dia. . . . .	1,000 " (3 " 3 $\frac{1}{2}$ " )
Boiler working pressure . . . . .	15.5 kg. per sq. cm. (220 lb. per sq. in.)
Boiler heating surface, tubes and flues (water side) . . . . .	170.5 sq. m. (1,835.3 sq. ft.)
Boiler heating surface, firebox (water side) . . . . .	20.4 " ( 219.6 " )
	190.9 " (2,054.9 " )
Boiler heating surface, superheater (steam side) . . . . .	70.6 " ( 759.9 " )
Total . . . . .	261.5 " (2,814.8 " )
Grate area . . . . .	4.0 " ( 43.0 " )
Wheelbase, rigid . . . . .	4,710 mm. (15 ft. 5 $\frac{7}{16}$ in.)
Wheelbase, total engine . . . . .	9,600 " (31 " 5 $\frac{11}{16}$ " )
Weight of engine in working order . . . . .	90.79 m. tons (89 tons 7 cwt.)
Adhesion weight . . . . .	64.4 " (63 " 8 " )
Tender, weight in working order . . . . .	57.73 " (56 " 16 " )
Water capacity . . . . .	22 cu. m. (4,840 gallons)
Fuel capacity . . . . .	10 m. tons (9 tons 17 cwt.)
Tractive effort . . . . .	(0.75 p.) 14,450 kg. (31,860 lb.)

The locomotive and tender materials and tolerances conform to the specifications of the German State Railway Company, and the firebox plates to the A.S.T.M. conditions. The design and construction of the locomotives in this series were carried out by Henschel & Sohn A.G. to the requirements of the Chekiang-Kiangsi Railway Company, and under the supervision and inspection of Messrs. Sandberg, Consulting Engineers, London.





*Interior of saloon*



*Buffet with separate lockers for the Free State and for Northern Ireland*

**NEW BUFFET CARS, GREAT NORTHERN RAILWAY (IRELAND)**

## NEW BUFFET CARS, G.N.R.(I.)

*Two up-to-date buffet cars, designed and built at Dundalk, have recently been introduced into the Dublin-Belfast service of the Great Northern Railway (Ireland)*



**A**MONGST the new passenger carrying rolling stock recently built at the Dundalk works of the Great Northern Railway (Ireland) are two buffet cars which are now in service on the main line between Dublin and Belfast. These cars are attached to the 10.30 a.m. train ex-Belfast, 3.15 p.m. ex-Dublin, and the 9.0 a.m. ex-Dublin, 2.45 p.m. ex-Belfast. By their provision passengers are now enabled to have refreshments, light luncheons or drinks en route, instead of the limited fare provided in the tea cars which previously ran on these trains.

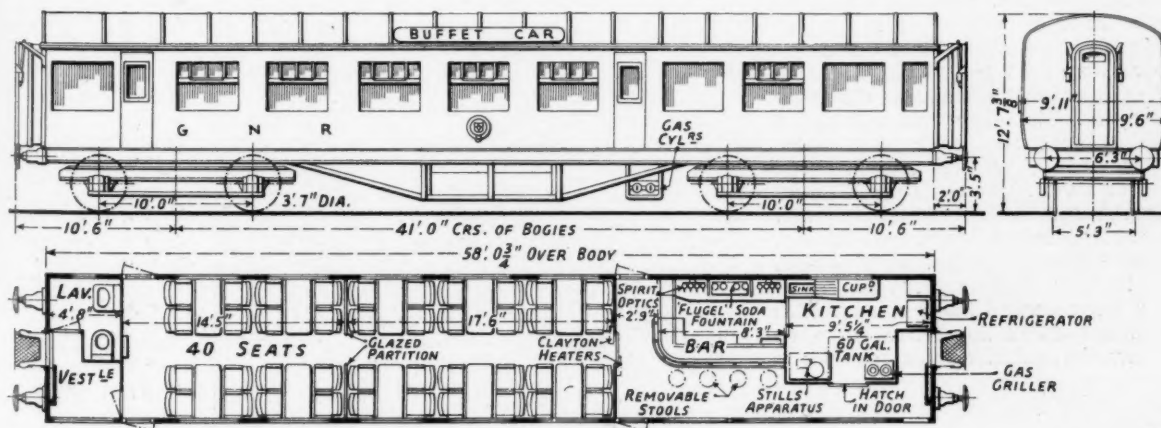
The cars have the standard overall dimensions of the company's bogie stock, and seat 40 passengers in rubber upholstered tubular framed chairs in two saloon compartments. A bar and kitchen occupy the remaining portion of one end; a lavatory with hot and cold water the other. The seats, which are not fixed, are, together with the Rexine covered tables, readily removed for cleaning purposes.

The bar is fitted out on up-to-date lines with bar stools and chromium plated hand and foot rails and fittings. The counter tops are of polished black asbestos panels relieved by red border lining. The space at the back

of the bar is occupied by two 4-bottle spirit optics, between which is a 4-vase Flügel soda fountain. Duplicate stocks of bottled drinks in sealed lockers are carried because of the service operating across the Free State-Northern Ireland border, the appropriate lockers being sealed and re-opened by the respective customs officials. A hinged falling shutter enables the attendant to lock up the bar when the car is out of service.

In the kitchen are installed a Stills boiling water system for tea making and for providing hot water for washing up. For the latter purpose two lead-lined sinks are provided, one in the kitchen and one in the bar compartment. A sliding door gives communication between kitchen and bar; an additional sliding door opening from the kitchen into the side corridor is fitted with a hinged service hatch, which in the open position provides a small counter, and in the closed position completes the door.

The floor, except in the kitchen, where it is of Sanolit, is covered with Battleship linoleum laid on cork felt. Heating is by means of Clayton steam heated fans, one of which is provided for each saloon and for the bar compartment. These fans are thermostatically controlled



General arrangement of new buffet cars for Dublin-Belfast services

by the temperature in the different compartments.

A grill and toaster is provided, fitted with rings for frying, &c. The Stills hot water system and grill are heated by gas, which is carried in high pressure containers, underneath the underframe of the car. This system has been adopted with success on a number of vehicles now in regular service. An electrically operated refrigerator of 4 cu. ft. capacity occupies the end space, the remainder being fitted with cupboards, shelves for plates, cups, utensils, &c. A copper water tank of 60-gall. capacity is carried in the roof.

The interior finish of the cars throughout is in high quality plywood, oak veneered; the general appearance being one of brightness and cleanliness. The lavatory is finished in silver Rexine. The bodies are of timber throughout, with the exception of the outer panelling which is of 16-gauge steel; the roof panels are galvanised. The gangways are of the latest suspension type.

The vehicles, which tare 32 tons each, were designed and constructed at Dundalk under the supervision of Mr. Geo. B. Howden, the company's Chief Engineer. The provision of these cars has met a long felt want, particularly during the summer season, and although in service a comparatively short time a large number of passengers are availing themselves of the facilities afforded.

**NEW SOUTH WALES RAILWAY FINANCES.**—Speaking at a luncheon of the Royal Empire Society, at Cannon Street station restaurant on May 4, Mr. B. S. Stevens, Premier and Colonial Treasurer of New South Wales, pointed out that half the capital debt of his State was invested in the Government Railways. The earnings of these railways which in 1932 were £15·8 millions, were—in spite of important freight and fare reductions—now £17·8 millions, and the corresponding expenditures were £12·5 and £11·7 million, a satisfactory reduction. Interest charges meanwhile fell from £7·8 to £6·5 millions and the deficit from £4·5 to £0·5 millions, and, he said, would be eliminated altogether next year. The 4·2 per cent. now earned was a result of capable management unhindered by political considerations, and of wage adjustments and staff re-organisation. Special concessions and rate reductions had, Mr. Stevens claimed, assisted improvement in trade to increase the business of the concern which was now run on sound business lines. The tramways—also a Government enterprise—were, he added, earning sufficient to pay a surplus over and above interest and sinking fund on the whole of their loan capital.



View taken on May 7, on the occasion of an inspection visit of His Excellency the Iranian Minister to the works of Beyer, Peacock & Co. Ltd., Gorton Foundry, Manchester, in connection with a contract nearing completion for four Beyer-Garratt locomotives for the Iranian State Railways. These locomotives are destined for the northern section of the line described in our issue of July 26, 1935. We hope shortly to publish more details of these interesting locomotives. The group in the front of the photograph, reading left to right, are: Mr. J. A. Kay, Editor, THE RAILWAY GAZETTE; Mr. W. C. Mitchell, General Manager, National Oil Refineries, Llandarcy, Neath; Mr. F. C. Hall, Locomotive Running Superintendent, Great Western Railway; Captain Hugh Vivian, Director, Beyer, Peacock & Co. Ltd.; His Excellency Hussein Ala, Iranian Minister; Mr. H. B. Heath Eves, Director, Anglo-Iranian Oil Co. Ltd.; Sir George Barston, K.C.B., Director, Anglo-Iranian Oil Co. Ltd.; Mr. S. Jackson, Manager, Beyer, Peacock & Co. Ltd.; Gorton Foundry.

BEYER-GARRATT LOCOMOTIVES FOR THE IRANIAN STATE RAILWAYS



# RAILWAY NEWS SECTION

## PERSONAL

At a meeting of the Railway Statistics Committee of the Railway Clearing House, held on May 7, Mr. G. Morton, Assistant Accountant, L.M.S.R., was unanimously appointed Chairman of the Committee for the ensuing 12 months.

The honorary degree of Doctor of Economics of the University of Lisbon has been conferred upon Sir Josiah Stamp, Chairman and President of the Executive Committee of the London Midland & Scottish Railway.

### IRAQ RAILWAYS STAFF CHANGES

As anticipated in these columns of our issue of April 3, Colonel J. C. Ward, C.M.G., C.I.E., D.S.O. M.B.E., Port Director and Director-General of Navigation, Basra, took over charge of the Iraq Railways as from April 1, in addition to his other duties, in place of Lt.-Col. J. Ramsay Tainsh, C.B.E., V.D., retired.

Early in April the following other changes took place:—

Mr. N. P. O'Reilly Blackwood, M.B.E., Traffic Manager, was appointed Deputy Director and Traffic Manager.

Ibrahim Beg El Kabir was appointed acting Chief Accountant, in place of Mr. A. P. Finlay, A.C.A., resigned.

Mr. E. A. T. Dillon, M.C., District Engineer, was appointed to act as Chief Engineer, in place of Major A. H. E. L. Holt, M.B.E., M.C., retired.

Mr. P. A. Challoner, A.M.I.Mech.E., M.I.Loco.E., Superintendent of Transportation (Traffic Operation) was appointed acting Chief Mechanical Engineer in addition to his other duties, in place of Major D. R. M. Yates, O.B.E., retired.

Mr. P. J. Howe was appointed acting Electrical Engineer in place of Mr. F. R. Lewis, retired.

Two Iraqi officers will in due course be appointed as Traffic Auditor and Assistant Traffic Superintendent in place of Messrs. L. C. Pannell and A. P. Massey retired.

Also, the Manchester agency is being closed and Mr. A. Rawlinson, the Agent, is retiring.

Sir Herbert Blain, sometime Assistant Managing Director of the London Underground group of railways and L.G.O.C., has been elected Chairman of the Trust of Transport Shares Limited.

Mr. J. C. Highet, F.C.H., who, as announced in our issue of April 17, has been appointed Member of the Indian Railway Board, was born in 1884 and went out to India from the Royal Indian Engineering College, Coopers Hill—where he was one of the top men of his year and was awarded a



Mr. J. C. Highet, F.C.H.,

Appointed to officiate as Member of the Indian Railway Board

Fellowship of Coopers Hill—as an Assistant Engineer on State Railways in 1905. He gained valuable experience on open line and construction works and also upon the Kashmir railway surveys in that grade. Becoming an Executive Engineer in 1914, he subsequently held the following posts: Assistant Secretary, Railway Board, and Munitions Board, of which he afterwards became Controller of Railway Materials; Secretary, Indian Stores Purchase Committee and Assistant Agent of the North Western Railway. Mr. Highet officiated as Deputy Agent between 1923 and 1926, then being appointed Secretary to the Railway Board. Subsequently he became Director of Establishment with the Board. He officiated as Agent, N.W.R., for six

months during 1931 prior to his confirmation in that post in 1932. He was elected President of the Indian Railway Conference Association for 1935-36, and is an Associate Member of the Institution of Civil Engineers.

### L.M.S.R. APPOINTMENTS

The following appointments have been approved by the directors:—

#### Chief Commercial and Chief Operating Managers' Departments.

Mr. A. Dawson, Goods Agent, Dewsbury, to be Joint Goods Agent, Keighley.

#### Chief Operating Manager's Department.

Mr. J. Scragg, Senior Clerk (Staff Section), Chief Commercial and Chief Operating Manager's office, Derby, to be Assistant (Outdoor Section—Telegraphs and Telephones), Chief Operating Manager's office, Euston.

Mr. T. F. Mitchell, Assistant District Locomotive Superintendent, Bank Hall, to be Assistant, Office of Superintendent of Motive Power, Euston.

Mr. G. W. Miller, Running Shed Foreman, Preston, to be Assistant District Locomotive Superintendent, Bank Hall.

Mr. G. A. Brown, Head Office Inspector (Accident and Accommodation), Office of Divisional Superintendent of Operation, Derby, to be Outdoor Assistant to Divisional Superintendent of Operation, Derby.

Mr. H. J. Hill, Assistant District Controller, Cudworth, to be Assistant District Controller, Wakefield.

Mr. H. W. Knight, Controller, Willesden, to be Assistant District Controller, Willesden.

Mr. J. L. O'Connell to be Assistant Horse Superintendent, London (Camden).

#### Chief Stores Superintendent's Department.

Mr. W. S. Johnson, Head of Section (Purchasing) Euston, to be Assistant, Euston.

Mr. H. Finney, Assistant Stores Controller and Sheeting Supervisor, Osborne Street, Manchester, to be Sheeting Shops Supervisor, Osborne Street, Manchester.

The Minister of Transport has appointed Mr. F. J. Urry as a representative of the interests of pedal cyclists,

to fill the vacancy on the Transport Advisory Council caused by the death of Mr. W. P. Cook.

Mr. W. E. Blakey, who, as announced in THE RAILWAY GAZETTE of May 1, has been appointed Assistant Goods Manager, North Eastern Area, L.N.E.R., entered the service of the North Eastern Railway as a junior goods clerk in 1904. He was posted to the Divisional Goods Manager's Office at Newcastle and to various goods offices in the area. In July,

Group, R.E.S.R., with the rank of Brevet-Colonel since 1932.

Mr. R. A. Smeddle, who, as announced in THE RAILWAY GAZETTE of May 1, has been appointed Manager of the North Road Locomotive Works, Darlington, L.N.E.R., was educated at Aysgarth and Harrow. He served in the R.F.A. in France during the latter part of the war and also the Army of Occupation. Towards the end of 1919, Mr. Smeddle became a pupil of the late Sir Vincent Raven, and later,

We regret to record the death, on May 11, of Mr. A. T. Blackall, M.Inst.C.E., who retired from the position of Signal and Telegraph Engineer, Great Western Railway, in June, 1923. Mr. Blackall was the son of the late Mr. Thomas Blackall, a former Signal Engineer of the same railway, and was born in 1858, educated at Richmond House School, Reading, prior to receiving his early engineering training under his father. After occupying various positions in the department, Mr. Blackall was appointed Signal Engineer



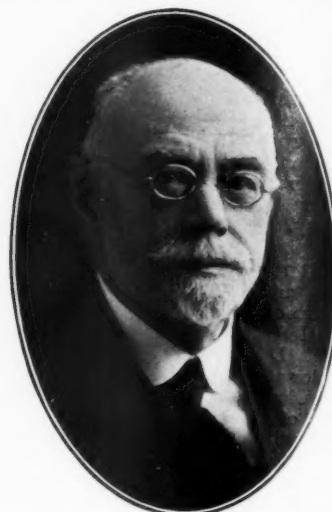
**Mr. W. E. Blakey,**

Appointed Assistant Goods Manager,  
North Eastern Area, L.N.E.R.



**Mr. R. A. Smeddle,**

Appointed Locomotive Works Manager,  
Darlington, L.N.E.R.



**The late Mr. A. T. Blackall,**

Signal and Telegraph Engineer, G.W.R.,  
1897-1923.

1914, Mr. Blakey was selected as a Traffic Apprentice. After a period of active service, during which he was granted a commission, Mr. Blakey returned in 1919 to the railway service at Newcastle Forth goods station, where he remained until January, 1920. From this date until July, 1920, he was engaged on special inquiry work for the Warehouse Working Committee. He was then transferred to the District Superintendent's office at Sunderland, in the Operating Department, later in 1920, and became head of Staff Department in the General Superintendent's Office at York in September of the same year. This position he occupied until early in 1923, when he was appointed Assistant District Superintendent at Newcastle, L.N.E.R. In April, 1927, Mr. Blakey became Staff Assistant to the Superintendent, York, and in November of the same year was appointed District Superintendent, Darlington. It was in August, 1932, that he became District Goods Manager, Middlesbrough, the position from which he is now promoted to be Assistant Goods Manager, North Eastern Area. In January, 1925, he was gazetted to the command of No. 1 Operating Company, Royal Engineers, Supplementary Reserve with the rank of Lieutenant-Colonel, and since January, 1929, he has been in command of the Railway Operating

of Mr. H. N. Gresley. Subsequently he had experience in the Running Department of the L.N.E.R. at Leeds and the Traffic Department at York. In 1925 he was appointed Assistant Works Manager at Cowlares, and in 1928 was appointed Assistant Carriage and Wagon Works Manager at York. In October, 1929, Mr. Smeddle was transferred to London as Outdoor Carriage and Wagon Assistant, and in April, 1931, returned to Cowlares as Works Manager, the position from which he is now promoted to Darlington.

#### C.P.R. ADMINISTRATIVE APPOINTMENTS

The following directors of the Canadian Pacific Railway Company were re-elected at the annual meeting of shareholders in Montreal on May 6: Messrs. D. C. Coleman, John W. Hobbs, R. S. McLaughlin, Sir Edward Peacock, G.C.V.O., and W. N. Tilley, K.C.

At the meeting of directors following the annual meeting of shareholders, Sir Edward Beatty, G.B.E., was re-elected Chairman and President, and Mr. D. C. Coleman, Vice-President. Also Sir Herbert Holt, Mr. W. N. Tilley, K.C., Sir Charles Gordon G.B.E., and Mr. Ross H. McMaster were re-elected members of the Executive Committee for the ensuing year.

in 1897. In 1903 he was given charge also of the Telegraph Department. Mr. Blackall is an old member of the Institution of Civil Engineers, and in 1911 was awarded the Trevithick Premium of that Institution. He has also been closely associated with the Institution of Railway Signal Engineers, and was the first President. During Mr. Blackall's tenure of office, signalling practice on the Great Western Railway was modernised throughout, and included a large number of special developments with which he was personally connected. Among them were several signalling appliances, the installation of electric and electro-pneumatic power signalling at Slough, Birmingham and other places on the system, automatic intermediate signals, experimental installations of upper-quadrant and three-position signalling, together with numerous other developments. In fact, a new signalling practice was built up on the G.W.R. during Mr. Blackall's term of office. Upon his retirement he was elected by the Council of the Institution of Railway Signal Engineers as an Honorary Member of that institution.

It is with regret that we note the tragic death of Mr. K. Furukawa, Director or Chief of the Electrical Department of the Imperial Govern-

ment Railways of Japan. He was stabbed by a dismissed workman.

We regret to record the death, on May 10, of Mr. Frederick Schooling, F.I.A., a Director of the Bengal-Nagpur and Barsi Light Railways, in his 85th year.

#### SOUTH AMERICAN STAFF CHANGES

Mr. C. H. Jukes, Chief of Statistics Department, Central Argentine Railway, sailed for England on leave of absence on April 2.

Mr. A. S. Matthews, who went to Argentina in 1934 as Assistant to the General Manager of the Central Argentine Railway, and was recently appointed Stores Superintendent of that system, as recorded in THE RAILWAY GAZETTE of March 20, has now been selected as General Secretary of the Inter-Railway Committee in Buenos Aires, an organisation which deals with the internal affairs of the British-owned railways and matters entailing dealings with the Government and labour unions, &c., where joint action is necessary. He is succeeded by Mr. Charles Case, who for 14 years has been Locomotive Running Superintendent of the Central Argentine Railway.

Mr. Geoffrey W. Morkill has been appointed General Manager of the Central of Peru Railway, in succession to Mr. F. F. Hixson, who, as announced in THE RAILWAY GAZETTE of January 10, has been appointed Representative of the Peruvian Corporation. Mr. Morkill, who is the son of Mr. W. L. Morkill, formerly Representative of the Peruvian Corporation, was born in Buenos Aires in 1892. He was educated in Canada, and after spending a year on the Central of Peru Railway, he studied railway engineering at McGill University, from 1911 to 1914. In 1915 he took part in the Yale University Archaeological Expedition to Southern Peru. From 1916 to 1919 he was on active service with the Royal Artillery in France. In 1921, Mr. Morkill re-entered the service of the Central of Peru Railway as a Traffic Inspector at Oroya, successively occupying the positions of District Traffic Superintendent at Oroya, 1922; Assistant Traffic Manager at Lima, 1928; and Traffic Manager, 1929. On January 1 this year he was appointed General Manager.

Mr. J. Masterton, Outdoor Carriage & Wagon Assistant to the Chief Mechanical Engineer, Southern Railway, has been appointed Film & Photographic Assistant to the Public Relations and Advertising Officer of that railway. A reference to the new section of the Advertising Department, of which he will be in charge, will be found in our news columns this week.

Mr. Masterton's former staff presented him with a radiogram and silver cigarette case on April 29, when they bade good-bye to him as their chief at a smoking concert held at the Amer-

sham Hotel, New Cross. The presentation was made by Mr. H. E. Kemp, who succeeds Mr. Masterton in the Chief Mechanical Engineer's Department.

At a meeting of Representatives, held at the Railway Clearing House, Mr. A. H. King, who recently retired from the Superintendent's (Rates and Fares) Department, G.W.R., was presented with a grandmother clock by old colleagues of the British and Irish railway and steamship companies, with whom he had been associated at Clearing House meetings.

At a meeting of the Railway Statistics Committee of the Railway Clearing House on May 7, Mr. A. D. Jones,

the recently retired Locomotive Running Superintendent, Southern Railway, was presented with a gold wristlet watch from the members of the committee. The presentation was made by the Chairman of the Committee, Mr. G. Morton, Assistant Accountant, L.M.S.R., who stated that Mr. Jones had been a member of the committee since its inception in January, 1920, and that his services had been greatly appreciated, not only for his ability but also for the genial and courteous manner he had displayed on all occasions. Mr. Morton asked Mr. Jones to accept the gift, not only as a memento of his long association with the members, but also as a token of their esteem and regard, and with best wishes for Mr. Jones' future years in retirement. Mr. Jones replied suitably.

### Mansion House Association on Transport

The annual luncheon and general meeting of the Mansion House Association on Transport were held at the Trocadero Restaurant, London, last Friday, May 8. Major Sir Isidore Salmon, M.P. (Chairman of the Association's Parliamentary Committee), took the chair.

Mr. W. H. Gaunt, the President, welcomed to the luncheon the Rt. Hon. L. Hore-Belisha, M.P., Minister of Transport. The association, he said, had been formed fifty-four years ago by traders using railways and canals, in order to protect their interests. Today, it was vitally concerned with the co-ordination of transport facilities, a problem of which the magnitude could be judged by the fact that there were 27,000 "A" licence holders in the road transport industry owning an average of 3½ vehicles each, while the 35,000 "B" licence holders averaged only 1½ vehicles each. As regulation and co-ordination proceeded, the trader was anxious to ensure that his freedom should not be limited unduly. Railway rates on classes of traffic susceptible to road competition did not represent the actual costs of operation, and it was the traders forwarding such traffic who would, in a sense, be surcharged to preserve the present railway economy if precluded from operating their own road transport.

The Rt.-Hon. Leslie Hore-Belisha, replying, referred to the assistance given by the Government to railway and road development. The £130 million to be spent on roads in the next five years would be additional to the millions ordinarily claimed by maintenance. The programme should eliminate all weak bridges. Such expenditure was justified by the fact that since he had been appointed to his present "dismal and unfortunate office," a net addition of 450 vehicles had been placed on the roads daily.

Sir William Larke expressed the appreciation of the heavy industries for the way in which the Government

had co-operated with the community. Transport rates, sometimes amounting in the case of heavy industries to 25 per cent. of the total costs, would have to be adjusted without causing a decline in consumption.

Mr. C. Clement Davies, M.P., said that at present there was much misdirection of transport. Many facilities were redundant, but the task was to co-ordinate them, not to cut them down.

At the general meeting which followed the luncheon the following elections were made: Messrs. G. Cadbury and Elliott Hoyle (Vice-Presidents); Mr. C. Clement Davies, M.P. (Parliamentary Committee); and Mr. G. F. Searle (Hon. Secretary).

### Longmoor Training Centre, R.E., Athletic Sports

At the kind invitation of Lt.-Col. J. P. S. Greig, Commandant, and the Officers of the Royal Engineers, who were at home at Longmoor Camp, we were present on May 6 at the finals of the Railway Training Centre, R.E., Inter-Section Athletic Sports. Favoured by ideal weather and thanks to the proverbial hospitality of our hosts, a most enjoyable afternoon was spent in the beautiful surroundings of Longmoor. Among the guests were the following:—

Brigadier C. A. Bird, Lt.-Col. Becher, Col. Bowley, Col. Chappell, Lt.-Col. Coningham, Lt.-Col. Duke, Lt.-Col. Denning, Col. J. Day, Lt.-Col. Ker-Gibson, Lt.-Col. Kerrich, Col. Newcombe, Col. H. A. Short, Brig.-Gen. Scholfield, Lt.-Col. Simson, Col. Tyrrell, Major Wilson, and Lt.-Col. Wrey-Saville.

The sports proved most entertaining with excellent finishes in many events; and as a result, the Inter-Section Sports Cup was won by No. 29 (Rly.) Survey Section. The prizes, &c., were distributed by Mrs. J. P. S. Greig. The R.E. Band, under the direction of Lieut. D. W. Jones, provided an attractive programme of light music throughout the afternoon.



## Ancillary Businesses of the British Railways

### III—Steamships

The steamship services of the British railways constitute an important ancillary business, which, like the docks, has suffered severely from trade depression and other causes. Since 1929 there has been a heavy decrease in tourist traffic to the Continent, while import and quota restrictions and fluctuations in exchange rates have considerably diminished the volume of Continental freight traffic. Similarly, political difficulties between Great Britain and Ireland have reacted adversely upon the Irish services. Particulars of the steamships owned by the four group companies are given below:—

services are those to and from Great Britain and Ireland via Holyhead and Kingstown, Holyhead and Dublin, Heysham and Belfast, and Stranraer and Larne, together with the cargo services between Holyhead and Dublin, and Holyhead and Greenore. The company also operates river steamers on the Clyde, and lake steamers on Windermere, &c., during the summer, in addition to which it has a half-interest in the Western Highlands services of David MacBrayne Limited.

The principal passenger services of the Southern Railway Company are those between Dover and Calais, Folkestone and Boulogne, Newhaven

Co. Ltd. One result of the pooling arrangements between these four companies is that the number of vessels engaged on the Goole and Continental services has been reduced since 1923 from 24 to 13.

In addition to these railway-owned services, the British railways co-operate closely with various steamship companies in the operation of through services to the Continent and Ireland, e.g., Harwich-Flushing, Harwich-Esbjerg, Fishguard-Cork, and Liverpool-Dublin.

### Financial Results

Comparative financial figures for 1929, 1934, and 1935 are shown in the table at the foot of this page.

It will be seen that three of the four companies secured increased gross receipts last year compared with 1934, with subsequent improvement in net results. G.W.R. receipts increased by nearly £14,000, principally under the heads of merchandise and livestock, and as the corresponding increase in expenditure was less than £3,000, the surplus of £17,330 is nearly treble that of 1934, and is a still greater improvement on 1929, when a slight loss was incurred.

L.N.E.R. gross receipts increased by over £50,000, of which £34,000 was due to passengers and £18,000 to merchandise. There was a slight reduction in expenditure, with the result that the adverse balance was reduced to £44,475, a decrease of £53,000 compared with 1934. Even so, 1935 compares badly with 1929, when a profit of £131,474 was made.

The total increase of over £75,000 in the L.M.S.R. gross receipts occurred under the heads of passengers and merchandise (£31,000 each), the balance being due to livestock. The net result was a profit of £260,452, an increase of £32,000 compared with 1934. This is the best result so far recorded by the L.M.S.R., and is attributable, in large measure, to the rationalisation of the services between Heysham and Fleetwood and Belfast.

Southern steamboat receipts declined by £18,000, chiefly in respect of passengers, with the result that net profit decreased by £15,000 compared with 1934, and £325,000 compared with 1929. Last year's decrease has been attributed to a transfer of cross-Channel passengers from the French to the Belgian route, due, in part, to the more favourable rate of exchange operating in the latter country. The Ostend services belong to the Belgian Government, which has benefited accordingly from the transfer of traffic.

	Over 250 tons net		250 tons net and under		Capital expenditure on steamships, and marine workshops
	No.	Net registered tonnage	No.	Net registered tonnage	
G.W.R. ...	10*	6,562	4	399	£ 414,965
L.N.E.R. ...	23	22,436	14	1,507	2,970,333
L.M.S.R. ...	28	20,585	14	1,744	2,919,022
Southern ...	34	22,203	9	993	2,937,321
L.N.E.R. and L.M.S.R. joint ...	—	—	4	494	—
Total ...	95	71,786	45	5,137	9,241,641

\* Including three steamships (owned by the Fishguard and Rosslare Railways and Harbours Company) worked by the G.W.R.

The G.W.R. steamship services are confined to the Fishguard-Rosslare and Fishguard-Waterford routes to Ireland, and the Weymouth route to the Channel Islands. Some tendering is performed at Plymouth in connection with the ocean liner traffic, and excursion trips are frequently run from Weymouth during the summer months.

The L.N.E.R. steamships are based principally on Harwich, whence services are operated to the Hook of Holland, Antwerp, and, during the summer, to Zeebrugge. The company also owns the Harwich to Zeebrugge train ferry, opened in 1924, and operates cargo services to Rotterdam. It is claimed for the L.N.E.R. steamships *Vienna*, *Prague*, and *Amsterdam* that they are the largest and most luxurious ships on cross-channel services, approaching closely the standard of luxury and comfort achieved by the most modern ocean liners. The s.s. *Vienna* has become one of the most popular short-cruising vessels used on the week-end cruises arranged by the L.N.E.R. during the summer months.

The principal L.M.S.R. steamship

and Dieppe, and Folkestone and Dunkerque. Cargo services are also operated between these ports, and the company will, in the near future, open a train ferry service between Dover and Dunkerque, the steamers for which are completed. A portion of the Southern company's fleet is based at Southampton, from which port the company operates services to the Channel Islands, St. Malo, and Havre. Actually, the L.S.W.R. was the first of the English railways to recognise the value of a steamship service to the Continent, and soon after the completion of the railway from London to Southampton the South Western Navigation Company was formed to run steamers between Southampton and Havre, the Channel Islands, and St. Malo. This company was absorbed by the L.S.W.R. in 1862.

Other services to Continental ports from Goole, Grimsby, and Hull are worked by the Associated Humber Lines, which comprises the Goole Steam Shipping (L.M.S.R.), L.N.E.R. Continental Services, Hull & Netherlands Steamship Co. Ltd., and Wilsons & North Eastern Railway Shipping

Company	Receipts			Expenditure			Surplus			Percentage of surplus to gross receipts		
	1929	1934	1935	1929	1934	1935	1929	1934	1935	1929	1934	1935
G.W.R. ...	£ 338,407	£ 304,731	£ 318,414	£ 339,613	£ 298,665	£ 301,084	Dr. 1,206	£ 6,066	£ 17,330	—	2.0	5.4
L.N.E.R. ...	998,049	699,871	751,433	866,575	797,409	795,908	131,474	Dr. 97,538	Dr. 44,475	13.2	—	—
L.M.S.R. ...	1,615,385	1,321,841	1,397,103	1,407,163	1,093,264	1,136,651	208,222	228,577	260,452	12.9	17.3	18.6
Southern ...	1,627,554	1,124,369	1,106,179	1,195,399	1,002,140	998,944	432,155	122,229	107,235	26.6	10.9	9.7

## Paris-Orleans-Midi Accelerations

Striking accelerations characterise the summer programme of the Paris-Orleans-Midi Railway of France, and the great majority of them, from their introduction today, are permanent. Curtailments of from one to three hours in the overall times of long-distance journeys are common, and it has even been found possible to deduct 41 min. from the schedule of so heavy a train as the Barcelona Express, with its fast timings over the mountainous grades of Central France. This train now leaves Paris (Quai d'Orsay) at 8 instead of 7.25 p.m., but reaches Port Bou at 9.25 instead of 9.31 a.m., thus completing the journey of 605 miles, with thirteen intermediate stops totalling over an hour in duration, in 13 hr. 25 min., at an overall average of 45 m.p.h. Most notable of the Central France accelerations, however, is that of the 7.3 a.m. from Quai d'Orsay, now starting at 7.30 a.m., reaching Limoges at 12.25 p.m. (a total gain of 1 hr. 47 min.), Brive-la-Gaillarde at 1.54 p.m. (2 hr. 1 min. faster), and Toulouse at 7.14 instead of 10.56 p.m., so saving 4 hr. 9 min. on the journey. New

connections are given and others proportionately accelerated. Night train No. 73 now leaves Paris at 9.50 instead of 8.25 p.m., and is accelerated 87 min. to Toulouse.

On the Bordeaux line the 12 noon, the heavy Pyrenees-Côte d'Argent sleeping car express, and the 9.30 p.m. sleeping car train from Paris, are all started from 15 to 20 min. later, but retain their previous Bordeaux arrival times, and the last-mentioned reaches Irun at 10.43 a.m., 13 min. earlier. Over this route the most outstanding acceleration is that of Train No. 25, now turned over entirely to postal business, leaving Paris (Austerlitz) at 9.57 instead of 9.10 p.m., and reaching Bordeaux at 4.48 instead of 5.15 a.m.—a journey quicker by 74 min. The speed limit over the 69½ miles between Les Aubrais and St. Pierre-des-Corps (electrically-operated) is raised from 120 to 130 km.p.h. (80½ m.p.h.). The 8.25 a.m. from Paris to Nantes and Le Croisic, now starting at 8.30 a.m., and accelerated by 21 min. to Le Croisic, runs non-stop over the 146 miles (electrically operated) from Paris to St.

Pierre-des-Corps, and the Sud Express will perform the same run except when calling conditionally at Les Aubrais.

By joint action of the Paris-Orleans-Midi and P.L.M. companies, also, some remarkable quickenings of cross-country service have been brought into operation. In particular, the Bordeaux-Lyons-Geneva night service is accelerated by 3 hr. 5 min. to a run of 16 hr. 3 min. eastbound; starting at 7.52 instead of 9.37 p.m. from Bordeaux, it reaches Lyons at 8.25 instead of 11.30 a.m., and Geneva at 11.55 a.m. instead of 4.45 p.m.—gains that are very important to the business traveller. Westbound, the time is cut from 16 hr. 12 min. to 15 hr. 25 min. With the help of a new express railcar between Bordeaux and Clermont-Ferrand, a fast day service between Bordeaux, Lyons, and Geneva is also introduced, giving times of 13 hr. 45 min. eastbound overall and 14 hr. 2 min. westbound. Better connections with the P.L.M. *via* Sète and Marseilles are also provided, in particular by the 8 a.m. (previously 7.53) from Bordeaux, which brings Riviera-bound travellers into Cannes at 9.20 p.m. (1 hr. 40 min. earlier) and Vintimille at 10.42 p.m. (2 hr. earlier).

## Rolling Stock for L.M.S.R. Wirral Electrification

In connection with the impending electrification of the L.M.S.R. Wirral section between Birkenhead Park, New Brighton, and West Kirby, contracts have been placed with British manufacturers for 19 all-steel, three-car bogie electric trains, together with the appropriate electric train equipment, details of which are given in our Contracts and Tenders columns on page 967 of this issue. It is expected that the conversion, which is being undertaken as part of the programme of works covered by the Railways (Agreement) Act, 1935, and which will permit the running of through trains between the Wirral and Liverpool in conjunction with the Mersey Railway, will be completed by Easter, 1937.

The new stock will be of all-steel, fireproof construction throughout, and each set will comprise a third class motor car with two motor bogies, a composite trailer car, and a third class driving trailer car. A driver's compartment will be provided at each end of the train. The train sets, which are of the fixed coupled type, can also be run in 6-car sets. The seating capacity of each 3-car train will be 141 thirds and 40 firsts, and the cars will be of the saloon type with wide gangways and large vestibules.

The new trains will be constructed of light, high tensile steels and aluminium alloys, with steel bodies and roof panels, and fireproof floors. The underframes and bogies will be built on the latest principles, and roller bearing axleboxes will be fitted. There will be two doorways 3 ft. 9 in. wide on each

side of each car, and air-operated sliding doors controlled by the guard will be fitted to ensure rapid loading and unloading of the trains. Ventilation will be by sliding or hinged lights above the side windows, and the electric heaters will be thermostatically controlled.

Most of the electrical gear will be carried on the motor car underframe,

thus allowing the maximum space for passenger seating. In order to save weight the contour of the coaches has been reduced and will be somewhat after the style of the cars used on the London Underground. Large side windows will be fitted, and the interior decoration below the waist will be carried out in English brown-oak in the third class compartments, and in Circassian walnut in the first class compartments, with polished birch or sycamore veneered top panels.

## German Traffic Through the Polish Corridor

The differences between the German and Polish authorities regarding through traffic to and from East Prussia, which came to a head on February 5, are understood to be approaching settlement. Pending a definite settlement, a provisional agreement was concluded on Friday last between the two Governments allowing part resumption of normal goods and passenger traffic through the corridor between Marienburg, Gros Boschpol, and Firchan from today (May 15) when the European summer timetables are introduced.

For the past three months the restriction placed on the through passenger train service by the Polish State Railways on February 7, 1936, has made it necessary to issue permit cards at times of peak traffic. They were used for the first time in connection with the Easter holiday traffic from April 5 to 17, inclusive, and passengers not in possession of a permit were, during this interval, not admitted to

the through East Prussia (privileged) trains between Berlin and that province, either way. Permits were dispensed with only on the Gross Boschpol-Marienburg section for ordinary trains 591/598, each way, and on the Kosenz-Deutsch Eylau section between Breslau and Königsberg for the through cars in trains D58, D55, D19, and D20, D56, D59, and, generally, for international passenger traffic via East Prussia.

The permits were issued gratis on showing or taking a ticket, and were supplied with the berth ticket to sleeping car travellers, but they gave no right to a seat or place, nor replaced tickets in any way. The issue of permits began at the earliest 10 days before the journey and ceased at latest 24 hours before the departure of the train concerned. A new permit was necessary for the return journey or in case of break of journey. Place (seat) tickets for which payment is made were suspended.

## MINISTRY OF TRANSPORT ACCIDENT REPORT

**Oakham, L.M.S.R.: November 25, 1935**

This report, by Major G. R. S. Wilson, relates to the 1.45 a.m. up freight train from Toton to Bedford, when running between Oakham Level Crossing and Eggleton signal boxes, colliding with a stationary brake van and 36 wagons, the rear portion of the 1.20 a.m. up freight train from Derby to Peterborough, which had become divided as a result of the failure of a three-link coupling. There were no personal injuries, but damage was done to the leading engine of the Toton to Bedford train and the brake van and seven wagons of the Derby to Peterborough train, with minor damage to the track. Both trains were double-headed and fitted with the steam brake on all engine and tender wheels, controlled by the vacuum, except in the case of the leading engine of the colliding train, which was not vacuum fitted. The Derby to Peterborough train was about 670 yd. long and weighed approximately 1,335 tons.

The point of collision was 170 yd. in rear of the Eggleton up distant signal on a short 1 in 484 falling gradient, and there is no obstruction to view. Eggleton signal box is on the up side of the line; the block instruments are of the Midland standard rotary interlocking type, and the signalman faces the traffic. It is the usual practice of signalmen in this box, under conditions of poor visibility—such as existed at the time of the collision—to view the tail lamps of passing trains through the open sliding window at the front of the box, from which the view of the line in both directions is unobstructed. The signal box in advance is Manton Junction, and in the rear is Oakham Level Crossing.

Major Wilson ascribes the cause of the division of the Derby to Peterborough train to a defective weld in a 3-link coupling, of the Gedge pattern, fitted to a Great Western 12-ton high sided open goods wagon built at Swindon in December, 1931. The last thorough, as opposed to "train," examination of the draw-gear was made at Bristol in 1935. The failure took place at the weld of the end link, on the side opposite to the two flats, and the fracture showed that the weld had adhered only partially or not at all for a length of  $\frac{1}{8}$  in. out of a total length of scarf of approximately  $2\frac{1}{2}$  in. The L.M.S. chemist at Derby, to whom the broken link was submitted, suggested in his report that the weld had been partially broken open for some time, or had never been properly joined. The train examination was made before leaving Derby at 1.20 a.m., but such a defect would be difficult to detect at the time. Major Wilson remarks that, after a visit to the Swindon works, he is satisfied that reasonable precautions are taken

to ensure reliability of material and workmanship of couplings manufactured there.

Goods guard H. Ward, of the divided train, carried out his duty with commendable promptitude when he realised that something untoward had occurred, and immediately went forward to ascertain the cause. The collision took place twelve minutes after he had come to a stand, and during this period, including the time spent in his journey to the point of division and in pinning down the brakes on three wagons, he covered some 770 yd. over the ballast in the dark and placed three detonators 189, 250 and 265 yd. from the rear of his van.

The drivers of the Toton to Bedford train saw the red light of the guard's hand signal, after having passed Oakham Level Crossing signal box at about 20 m.p.h. with all signals clear, and almost immediately afterwards the three detonators were exploded. Major Wilson is satisfied that, by the prompt actions of the guard and the drivers, the speed of the following train was reduced as far as was possible before the collision occurred.

The comparatively serious consequences that followed must be attributed to the failure on the part of the signalman at Eggleton signal box, A. Bennett, to detect the absence of a tail lamp on the leading portion of the Derby to Peterborough train as it passed his box. On the night in question the weather had been fairly clear up to about 4 a.m., when his fog object, the up starting signal, 340 yd. away, became obscured, but at the time of the collision, 4.30 a.m., he had not called out the fogmen. The Derby

to Peterborough train was checked at the home signal, and on receiving acceptance from Manton Junction, he lowered his starting signal and showed a green hand signal, since, he said, the driver would be unable to see the starting signal on account of poor visibility. Immediately after the train had passed, Bennett became doubtful if he had seen the tail lamp, and telephoned to the Oakham Level Crossing signalman to ask whether the train was complete with tail lamp when it passed the latter box, and received an affirmative reply. He gave "train-out-of-section" at 4.22 a.m., but could not say for certain whether before or after this telephone conversation. Immediately after he had sent the signal he was offered and accepted the Toton to Bedford train, and he was again "not very happy" about the first train so telephoned twice in rapid succession to Manton Junction, to be told that the train had passed without a tail lamp.

Major Wilson reports that Signalman Bennett admitted his failure to observe the tail lamp, but that his account of his actions during the few minutes before the accident is not very satisfactory. He did not, in fact, properly satisfy himself in the first instance, as Block Telegraph Regulation No. 19 requires, that the train was complete, and almost at once began to doubt his own vigilance, yet he failed to follow his doubts by the logical action prescribed by this Rule, and committed the serious error of giving the "train-out-of-section" signal for the first train and accepting the second with no other confirmation than the correct assurance that the train was complete when it passed the box in the rear, concluding, without any justification, that the train had also passed through the section complete.

No recommendation is made.

## Condensing Locomotives in Russia

On pages 675-678 of THE RAILWAY GAZETTE dated October 25, 1935, we published an article dealing with a Russian 0-10-0 type freight locomotive converted by Henschel & Sohn of Kassel last year to the condensing system by the provision of a tender with condensing apparatus. According to an official statement recently issued, the use of condensing locomotives is to be widely extended on the railways of the U.S.S.R., and the inauguration of this programme is witnessed by the production of a new type of locomotive, the first of the kind to be built in a Russian locomotive building establishment. The new locomotive is claimed to be of particular importance in the Far East and Middle Asia, where the water supplies are scarce. While the usual Soviet locomotives take water every 60 to 70 km., the new engine will cover at least 1,000 km. without stopping for this purpose, and it is further expected that the distance will be increased to 1,500 km. when the

measures for separating oil from the exhaust steam have been improved. The new condensing locomotive is stated to be almost completely noiseless and smokeless. The tender, with its full capacity of 13,850 litres (3,050 gall.) of water weighs 73.4 tons. The new locomotive is expected to achieve 5 to 8 per cent. economy in fuel as the result of the special design of firebox.

The Soviet locomotive industry plans to produce several hundred locomotives with condenser equipped tenders this year. Not only the new SO (Serge Ordjonikidze) type freight engines, but also passenger train locomotives of the JS (Joseph Stalin) type and freight train locomotives of the FD (Felix Dzershinsky) and E types, are to be equipped with exhaust steam condensers. Finally, it is considered that condensation of steam is of such great importance in Russia that locomotives of all types are now being scheduled to be supplied with condenser-equipped tenders.



## QUESTIONS IN PARLIAMENT

### The Forth Ferry Service

Mr. Erskine Hill on April 29 asked the Minister of Transport if he could state the charges made by the owners of the ferry operating between North and South Queensferry in respect of the transport of motor vehicles of between two and four tons and of over four tons; and whether he can state the stage reached with the proposition to run a special night service for heavy vehicles to cope with the large number of these vehicles which at present cannot use the ferry owing to the prohibitive cost of transport.

Mr. Hore-Belisha. — Charges for mechanically-propelled goods vehicles using Queensferry passage are:—

Unladen weight		Per unladen vehicle	Per laden vehicle
Exceeding	Not exceeding	s. d.	s. d.
2 tons	2½ tons	7 0	12 6
2½ ..	3 ..	8 6	15 6
3 ..	4 ..	11 6	22 6
4 ..	5 ..	14 6	30 0

The maximum unladen weight of goods vehicles accepted for transport is 5 tons. The L.N.E.R. informs me that it is not aware of any proposal to run a night service of the ferry and that no suggestion that such service is necessary has been brought to its notice.

### Main Line Electrification

Mr. Day on May 6 asked the Minister of Transport whether he was in a position to make a statement with reference to the further electrification of main-line railways and the result of the latest investigations made by the Railway Companies' Association and their conclusions.

Mr. Hore-Belisha. — I am informed by the Railway Companies' Association that, apart from the schemes referred to in the Railways (Agreement) and London Passenger Transport (Agreement) Acts, 1935, the only other proposal at present definitely decided upon is the electrification of the L.N.E.R. line from Newcastle to South Shields. The L.M.S.R. has under examination certain additional sections of line which might be suitable for electrification, but has not yet reached any decision in the matter.

### Doncaster Station

Mr. Short on May 6 asked the Minister of Transport if he could state when the reconstruction of L.N.E.R. Doncaster station, scheduled under the railway agreement, was likely to be commenced.

Mr. Hore-Belisha. — I am informed by the L.N.E.R. that, whilst preliminary work (which is necessarily of a complicated character) is proceeding, it is not possible at present to fix a date for starting operations on the site.

### Rating for Railways

Mr. Oliver on May 7 asked the Minister of Health whether, in view of the judgment given by the Railway and Canal Commission with respect to

the assessment of the Southern Railway for rating purposes and the consequential financial burden cast upon the local authorities, he would take an early opportunity to meet representatives of the authorities affected to consider the desirability of granting financial assistance in relief of the heavy charge upon the rates.

Sir Kingsley Wood. — I shall be ready, as always, to consider any representations which local authorities or their associations may desire to make to me.

### District Railway Doors

Mr. Groves on May 7 asked the Minister of Transport if he was aware of the danger to the travelling public resultant from the fact that many of the trains operating on the Inner Circle of the District Railway were still without pneumatically controlled doors, and that, therefore, on many journeys the doors were not closed, and passengers were exposed to danger and the discomfort of cold and draught; and whether he would make representations to the London Passenger Transport Board to provide additional platform staff to ensure the closing of the train doors.

Mr. Hore-Belisha. — I am in correspondence with the board on the subject, and will communicate the result to the hon. member.

### Railway Agreement Works

Mr. Short asked, on May 13, the Minister of Transport if he could state what works scheduled under the railway agreement had now been put in hand; the amount of expenditure such works involve; and the number of unemployed persons found employment.

Mr. Hore-Belisha. — Arrangements have been made for periodical returns to be furnished by the companies of work begun and labour employed on these schemes as soon as the Parliamentary powers which are necessary for many of them have been obtained under the Bills now before Parliament. Meanwhile I should be glad to obtain for the hon. member information in regard to any work in which he is particularly interested.

### First Class in London

Sir John Power on May 13 asked the Minister of Transport if he was aware that the London Passenger Transport Board allowed third class ticket holders to travel in first class compartments during rush hours on the District Line east of Charing Cross without extra charge; if he would inquire during what hours this was permitted; whether the same privilege was extended to all passengers on the same line west of Charing Cross to Wimbledon and other towns; and, if not, would he take steps to see that all passengers, irrespective of class of ticket purchased, were placed on one level.

Mr. Hore-Belisha. — I am informed by the London Passenger Transport Board

that the arrangement referred to in the first part of the question applies between Mark Lane—not Charing Cross—and stations east thereof, between the hours of 5 and 7 p.m. on Mondays to Fridays, and between 12 noon and 2 p.m. on Saturdays. The practice was introduced about 20 years ago owing to the very dense third class traffic on this section of line, where first class traffic is exceedingly small. Its application to other parts of the line, where circumstances are different, would not, in the view of the board, be warranted. The matter is not one in which I have power to take any action.

## Parliamentary Notes

### Progress of Railway Bills

The L.N.E.R. Order Confirmation Bill was on May 12 read a third time in the House of Lords and passed and sent to the Commons. Standing Orders have been dispensed with in respect of the further additional provision in the L.N.E.R. (General Powers) Bill relating to the sale of the Tyne Docks undertaking. A petition against this further additional provision has been deposited by the Railway Clerks Association and the National Union of Railwaymen. Of the other petitions against the Bill twelve have been withdrawn including those relating to the Grantham Canal proposals. The Bill was to have been in Committee on Tuesday, but the date of hearing has been altered to May 14 (yesterday). The L.N.E.R. (London Transport) and the Southern Railway Bills which were read a third time and passed in the House of Commons on May 8, and the G.W.R. (Ealing and Shepherd's Bush Railway Extension) which received a third reading in the Commons on May 7, were read a first time in the Lords on May 12.

### Severn Bridge Bill

This Bill, which had occupied nearly 11 days in the hearing before a Select Committee of the House of Commons, presided over by Sir David Reid, was rejected, on May 12, by a majority, on the promoters' own case. The Bill was promoted jointly by the County Councils of Gloucestershire and Monmouthshire and provided for the construction of a bridge and approach road estimated to cost £2,470,000 and for additional works estimated to cost another £500,000. The Ministry of Transport was prepared to make a grant of 75 per cent. towards the cost, and the two County Councils were ready to provide 12½ per cent., leaving the remaining 12½ per cent. to be provided either by other local authorities or tolls, with a time limit during which tolls were to be charged. Strong opposition was shown on engineering grounds and on the ground of possible interference with navigation. The Great Western Railway Company was particularly concerned with the risks to the Severn tunnel. We make further reference to this Bill in an editorial note on page 934.

## RAILWAY AND OTHER MEETINGS

### San Paulo (Brazilian) Railway Co. Ltd.

The ordinary general meeting of the San Paulo (Brazilian) Railway Co. Ltd. was held at Southern House, Cannon Street, E.C., on May 12, Mr. Oliver R. H. Bury, M.Inst.C.E. (Chairman of the company) presiding. The Secretary (Mr. Vernon Hinde) read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and accounts, said that the year under review was one of special difficulty for the company. The average rate of remittances was only 2-819d., the lowest the company had ever experienced, compared with the rate of 3-901d. in the previous year. The main trend of the traffic of the railway was, however, favourable, reflecting industrial activity both in the State of San Paulo and Brazil generally. It very soon became evident that with the falling value of the Milreis the new tariffs introduced on January 1, 1935, would prove quite insufficient for the realisation of a return of 7 per cent. on the recognised capital, which was the minimum return contemplated in the company's contract with the Federal Government of July, 1936. As a result, from January 1 of this year, a further increase of 15 per cent. on all classifications with the exception of coffee was put in force. The simultaneous abolition by the Federal Government of the Transport Tax minimised the effect of this increase on the public.

Receipts for the year were 109,241 contos, or £1,283,000 sterling, compared with £1,636,000 in 1934. Working expenses were 77,864 contos, or in sterling £914,740, compared with £1,236,525 in the previous year. Out of the final balance for the year of £120,869, the board recommended a final dividend of 2½ per cent. less income tax on the preference stock, making with the interim dividend of 2½ per cent. paid in October last a dividend of 5 per cent. for the year, and on the ordinary stock a dividend for the year of 2½ per cent. free of income tax, carrying forward £20,869, against £30,057 brought into the account.

The payment to the associated road motor company, under agreement, of £37,147, represented the amount paid in consideration of the traffic handed to the railway. The results of the road motor company continued to be encouraging. Out of 158,000 tons of goods carried in the road vehicles, 132,000 tons were handed to the railway in mutual traffic, and 3,764 contos of reis, or, say, £44,000, were paid to the railway in freights. Road passenger services carried some 330,000 passengers, compared with 77,252 in the previous year.

Receipts from passenger traffic

showed an increase of 12 per cent. in value and an increase of 11 per cent. in the number of passengers carried. The service between San Paulo and Santos was improved by the continued operation of the company's diesel-electric train, with satisfactory results.

## RAILWAY AND OTHER REPORTS

**Midland Railway Company of Western Australia.**—An interim payment of 2 per cent. will be made on July 1 on the second mortgage cumulative income debenture stock on account of the year ending June 30, 1936.

**Associated Equipment Co. Ltd.**—The directors, at their meeting on May 11, resolved that an interim dividend at the rate of fivepence per £1 unit of stock, free of income tax, be paid to the members whose names appear on the register of members at this date, in proportion to their respective holdings of stock, and that dividend warrants be despatched to members on or about June 15, 1936.

**Nitrate Railways.**—The operations of the railway for the past year resulted in a net profit of £16,853 which, however, was more than absorbed by exchange losses. Due to this and because, despite the board's continued efforts, no arrangement has yet been made with the Chilean Government in regard to the Iquique-La Noria Concession, which terminates on July 26 next, the directors have decided not to recommend the payment of a dividend in respect of the year ended December 31, 1935. By reason of dividends and interest received the carry forward is increased from £144,487 to £176,459.

**Thames Valley Traction Co. Ltd.**—Jointly controlled by Tilling & British Automobile Traction Limited and by the Great Western and the Southern Railway Companies, this company secured in 1935 a net profit, after appropriating £5,000 to general reserve, of £11,321, which, added to £6,562 brought in, gives a total of £17,883. The directors recommend a dividend of 7½ per cent. (the same) on the share capital, and this will absorb £11,250, leaving £6,633 to be carried forward. During the year the whole of the share capital of the Ledbury Transport Co. Ltd., and that part of the Penn Bus Co. Ltd. operating in the area, have been acquired.

**Armstrong Whitworth Securities Co. Ltd.**—A reduction from £40,372 to £18,326 in the loss on working is shown by this company's report for 1935. It also had to provide £131,659, against £283,343 in 1934, for losses on subsidiary companies. During the year Sir W. G. Armstrong Whitworth & Co.

The company was considering placing an order for two more diesel-electric trains of the same type for excursion service. Goods traffic receipts had risen from 69,000 to 83,000 contos of reis. Greater movement both in passengers and goods was expected in the current year. To May 3 traffic receipts in sterling were £513,000 compared with £393,356 in 1935.

The payment of the dividend was approved, and the report and accounts were unanimously adopted.

(Engineers) Ltd. completed a contract for the building of 100 steam locomotives for the London Midland & Scottish Railway, which has given a further order for 227 locomotives. The works generally are fairly well employed, and the conditions and prospects have much improved. The chilled rolls business of Sir W. G. Armstrong Whitworth & Co. (Ironfounders) Ltd. improved further, and the outlook in this connection is considered encouraging.

**Oxford Transport Trust Limited.**—This company, formerly known as the Oxford Tramways Syndicate Limited, assumed its present title on August 2 last. The accounts for the year ended March 31, 1936, show a profit of £10,674 (against £10,298) plus £1,124 brought in. It is proposed to declare a final dividend of 5½ per cent. (against 5½ per cent.), making 8½ per cent. (against 8½ per cent.) tax free; and to carry forward £1,385. The company (an associate of the British Electric Traction Co. Ltd.) owns 50 per cent. of the share capital of the City of Oxford Motor Services Limited, which it therefore controls jointly with the G.W.R.

## Forthcoming Events

- May 18 (Mon.).—Institute of Transport (Scottish), at North British Station Hotel, Edinburgh, 7.15 p.m. Annual General Meeting.
- May 19-20.—Electric Lamp Manufacturers' Association of Great Britain Limited, 2, Savoy Hill, London, W.C.2. Conference.
- May 20 (Wed.).—Diesel Engine Users Association, at Caxton Hall, Caxton Street, London, S.W.1, 5 p.m. "Diesel Engine Combustion Research," by Mr. A. F. Sanders.
- Institution of Railway Signal Engineers, at Inst. of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. "Electro Pneumatic Operation for Signalling Apparatus," by Mr. R. Proud.
- May 20-23.—Institute of Transport, at Queen's Hotel, Birmingham. Annual Congress.
- May 22-June 1.—Institution of Locomotive Engineers. Summer Meeting in Germany.
- May 23 (Sat.).—Hunt's Bank Athletic Festival, at Bloomfield Road Football Ground, Blackpool, 1 p.m.
- May 25 (Mon.).—Indian State Railways, at Café Monico, 19, Shaftesbury Avenue, London, W.1, 7 for 7.30 p.m. Annual Dinner.
- May 26 (Tues.).—Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "Recent Developments in Metallurgy and their Influence on Engineering," by Mr. Eugene Schneider.
- May 31-June 6.—Industrial Transport Association, at Central Hotel, Glasgow. Annual Conference.

## NOTES AND NEWS

**Waiting Room Facilities at Paddington.**—For the convenience of passengers, bathrooms are to be installed by the G.W.R. in the ladies' waiting room on No. 1 platform at Paddington station.

**City of London Airport.**—At a court of the Common Council, presided over by the Lord Mayor, it was decided on May 7 to establish a City of London airport at Fairlop, Essex, at a capital cost of £600,000.

**125 m.p.h. in Germany.**—According to a press report from Berlin, a maximum speed of 124·89 m.p.h. was reached by a Borsig streamlined steam locomotive drawing a train with 100 passengers in the course of a recent demonstration run between Hamburg and Berlin.

**More G.W.R. Containers.**—The Great Western Railway is to increase its stock of 1,673 containers by 200 to meet the increasing demand of traders. Of these, 25 will be fitted for the conveyance of cycles; 50 will be of the insulated type for carrying imported and other meats; 50 will be for furniture removals; and 75 for general use. All the new containers will be built at Swindon works.

**Gatwick Airport.**—The new London South airport at Gatwick will be used by a regular air service for the first time on Sunday next, May 17, when British Airways Limited will transfer its planes from Heston. Railway Air Services Limited will begin working over the London-Isle of Wight route from Gatwick on May 25. To meet the requirements of air passengers, the Southern Railway announces that additional trains will stop at Tinsley Green (Gatwick airport station) on and from May 17.

**Wide Powers for New Zealand Minister of Transport.**—In the New Zealand House of Representatives, on May 12, a Bill giving the Transport Minister virtually dictatorial powers over all means of transport passed its first reading, states a Reuters cablegram. Under this Bill, final authority for the licensing of all commercial road and air services is vested in the Minister, and he is also empowered to revoke or suspend any licence if the service proves unsatisfactory. With the recent abolition of the Railways Board, all forms of transport would thus be under direct Ministerial control.

**The Grantham Collision.**—On January 19 two light engines coupled together collided with the rear of a ballast train on the down line between Grantham and Barkston, L.N.E.R., killing eight men and seriously injuring four others who were riding in the ballast van. Last Tuesday, the two drivers of the engines, David Ward and George Smith and the fireman of the leading engine, Harold Talbot, all of York, were charged at Grantham with

the manslaughter of the victims. It was alleged for the prosecution that the defendants passed four signals at danger, and that it was owing to their negligence that the accident happened. The hearing was adjourned for a week.

**L.M.S.R. Women Ambulance Workers.**—Four teams have qualified to compete in the final of the L.M.S.R. women's ambulance competition (open to teams from England, Scotland, and Wales), to be held at the Euston Hotel, today, May 15. They are—Glasgow (B), Glasgow (A), London (D), and London (A).

**More L.N.E.R. Colour-Light Signals.**—The L.N.E.R. announces that colour-light signalling is to be installed on the main Eastern Counties line between Shenfield and Chelmsford. Colour-light signals are already in service on the section between Gidea Park and Shenfield; this installation was described and illustrated in our issue of January 19, 1934, and the colour-light aspects were shown in a coloured plate on February 16 of the same year.

**A.A. Membership Reaches 600,000.**—On May 12 the membership of the Automobile Association, the world's largest motoring organisation, passed the 600,000 mark. Founded in 1905 by a few enthusiasts to fight prejudice against motorists and the enforcement of the 20-mile speed limit, the association has grown to its present magnitude in just over thirty years. At the outbreak of the war A.A. membership had reached 83,000; the first 100,000 was obtained in February, 1920; the quarter million in 1926; and on August 24, 1933, the half million mark was passed.

**Railway Wages.**—The special conference of the National Union of Railwaymen called to consider the proposals made by the representatives of the railway companies and of the three railway trade unions for the replacement as from July 1 next of the present deduction of 2½ per cent. from all earnings by a deduction of 1½ per cent. from all earnings, decided on May 13 not to accept the proposals. The Associated Society of Locomotive Engineers and Firemen will, it is understood, deal with the matter at the annual conference which opens in private in London next week. Certain press reports indicating that the society had accepted the proposals are not correct. The proposals have not so far been put before a general meeting of the Railway Clerks' Association.

**Holiday Season Tickets, L.N.E.R.**—To help to extend the popularity of holiday season tickets during the present summer, the L.N.E.R. has issued two attractive photogravure folders and a series of Quad Royal posters. Ranging from five shillings to seventeen and sixpence for third class, and seven and sixpence to twenty two and six for first class, these tickets give unlimited

travel within a prescribed area for a period of one week. Bicycle tickets are issued for five shillings, and a dog may accompany his master for half-a-crown. The two folders set out the details of each area; maps and illustrations amplify the descriptive matter. The posters consist of maps upon which are superimposed illustrations of places of outstanding interest included in the areas covered.

**Alliance Assurance Railway Holdings.**—It was stated recently that the Alliance Assurance Company's interest in railways was £8,311,475. The figure includes securities in other undertakings, and is made up as follows: railway and other debentures and debenture stocks, home and foreign, £6,046,567; railway and other preference and guaranteed stocks, £2,105,294; and railway ordinary stocks, £159,614.

**Basingstoke and Alton Light Railway.**—The Southern Railway announces that on and from Monday, June 1, all services over the Basingstoke and Alton light railway will be withdrawn and Cliddesden, Herriard and Bentworth, and Lasham stations will be closed. Passenger trains were withdrawn on September 12, 1932, and the junction at Alton was taken out. A regular freight service has since been worked from the Basingstoke end. Delivery and collection of general goods traffic and parcels from the area served by the light railway will be carried out from and to Basingstoke by the Southern Railway Company's road cartage organisation; local arrangements for delivery of coal and coke traffic from Basingstoke are being made.

**Steel Tube Trade Arrangement.**—We are informed that Mannesmannröhren-Werke A.G., of Düsseldorf, has entered into an agreement to exchange its interest in the British Mannesmann Tube Co. Ltd. for an equivalent amount of preference shares of United Tube (Holdings) Limited, a newly-formed company of which the equity is held jointly by Stewarts and Lloyds Limited and Tube Investments Limited. It is a condition of the agreement that the use of the name British Mannesmann Tube Co. Ltd. will be discontinued within six months after the official date of the re-arrangement. For each £1 ordinary share in the British Mannesmann Tube Co. will be issued one 4 per cent. cum. pref. share of £1 3s. 4d. in United Tube (Holdings).

**Heavy Rails in U.S.A.**—More than three-quarters of all the steel rail produced in the United States last year was in the 100-lb. section or heavier, according to figures compiled by the American Iron and Steel Institute, the production of such rails having exceeded 500,000 tons. Steel rails produced in 1935 totalled 711,537 tons. This represents a reduction of 29·5 per cent. from the total of 1,010,224 tons in 1934, when production was stimulated by P.W.A. loans to the railroads. The output, however, was considerably larger than for either 1932 or 1933, when



the corresponding totals were 402,566 and 416,296 tons, respectively. Of the total of 711,537 tons produced last year, 340,800 tons weighed between 100 and 120 lb., 154,367 tons weighed between 120 and 136 lb., and 58,858 tons weighed 136 lb. and over.

#### Long Welded Rails on the Nord.

The Northern Railway of France welds rails end to end, generally second-hand rails, with the object of obtaining lengths of 24 metres (78 ft. 9 in.) for running lines, and longer lengths for places where either the temperature range is small or its effects are not important, such as tunnels, steel bridges of long span, and lines in marshalling yards and sidings. The method used is generally Thermit, but the company has begun to use electric-arc welding and flash resistance welding.

**New Films and Photographs Section, Advertising Department, Southern Railway.**—Owing to the rapid growth of the use of photographs and films in connection with Southern Railway activities, a new section has been added to its Advertising Department to deal entirely with this branch of work. The section will be responsible for every kind of photograph, including views of current events, technical subjects and holiday resorts, and in view of the increasing use that is now being made of cinematograph films for publicity and educational purposes, the new organisation will see to the co-ordination and development of this side as well. As announced in our personal columns this week, the chief of the new section is Mr. J. Masterton, who took up his new appointment on April 1.

**L.N.E.R. Summit Indication Signs.**—The L.N.E.R. has recently erected new signs to distinguish the Stainmore summit on the Darlington to Kirkby Stephen line where a height of



New summit sign recently erected by the L.N.E.R. amid rugged scenery at Stainmore on the Darlington to Kirkby Stephen line

1,370 ft. is attained. The new signs, designed to attract the attention of passengers in a more persuasive manner than hitherto, have been designed by Mr. J. Miller, LL.D., Engineer for the North Eastern Area. It will be seen from the photograph reproduced that the letters have been cut out of sheet steel and cannot fail to be seen by the passenger in a passing train.

**Southern Railway Posters.**—"You can't visit the stars—but you *can* visit the star resorts of the earth by Southern Railway" is the slogan upon which the company has based a new poster. Against the intense black of interstellar space, a Southern express is seen rushing towards an astronomical body in the top left-hand corner, whilst various stars and patches of nebular matter provide scenery for the travellers. We notice that the Southern Railway relies upon the steam locomotive for its celestial excursions. A scene on the River Seine, with the bows of a Southern Railway cruising steamer in the foreground, figures in a photograph poster advertising the company's popular week-end and mid-week cruises to Rouen and elsewhere.

**Central Argentine Railway Capital.**—The directors of the Central Argentine Railway, in a circular issued to shareholders on May 12, explain that under the present prevailing circumstances the company is unable to provide for repayment on July 1, 1936, of the £1,985,700 of 6 per cent. notes now outstanding. It is now proposed to extend the redemption date to July 1, 1941, and to reduce the interest from 6 per cent. to 5½ per cent. It is also proposed to create and issue additional 5 per cent. redeemable debenture stock 1967/87 ranking *pari passu* with the existing stock of that character, holders of the notes to have the right to exchange into 5 per cent. debenture stock at the rate of £110 stock for every £100 notes. An extraordinary general meeting to pass the necessary resolutions will be held at River Plate House, E.C., on June 4, at 12.15 p.m.

**L.M.S. (London) Amateur Dramatic Society.**—On Friday and Saturday of last week the L.M.S. (London) Amateur Dramatic Society presented, at the Cripplegate Institute, Ivor Novello's West-End success, "Fresh Fields." The languishing Lady Lilian (Nancy McIntosh) and the intriguing Lady Mary (Jessie Wilson) were ably supported by a cast in which Marguerite Ibbett played Mrs. Pidgeon and Winifred Hill that terrible little Australian's daughter, Una. The boisterous Tom Larcomb was played with due heartiness by Reginald Brockwell, and Mary Picknell, as the secretary, and James Proudley, as the butler, were suitably subdued. Tim Crabbe (Bernard Sampson) had a good swagger, while Constance Wells carried well the difficult part of a society lady. The producer, Mr. W. E. Humphreys, is to be congratulated on his presentation of this farcical story of unbelievably eccentric

and irrational women which found its climax with Lady Mary and Miss Pidgeon indulging with sublime indifference in some delightful geographical inexactitudes. The L.M.S. (London) Orchestral Society supplied the incidental music.

**Streamlined Trains in the U.S.S.R.**—The Mitishi car works, near Moscow, is building some streamlined electric trains for the 1,500-volt long-distance suburban lines running out of Moscow. The maximum designed speed is 85 m.p.h., and in order to reduce weight the bodies are being made of chrome-manganese-silicon steel.

**French Licence for Vulcan-Sinclair Coupling.**—Following the decision of the Michelin Company to standardise fluid couplings and epicyclic gearboxes for its pneumatic tyred railcars, Hydraulic Coupling Patents Limited has just granted a licence for the manufacture of the Vulcan-Sinclair fluid couplings at the Michelin works. These couplings already have been supplied to the French concern for cars of 250,360 and 700 b.h.p., and Michelin is now fitting them to a train of 1,400 b.h.p. Other French applications are in the Lorraine cars for the State and Eastern Railways.

**A G.W.R. Poster Novelty.**—The richness of colour and design obtained by the Romans in their tessellated pavements have inspired a new style of Great Western Railway poster, in which the picture is built up on the same principle of grouped rectangles in different colours. The first two examples depict respectively Devon and Cornwall. The artist, Mr. Ronald Lampitt, has chosen a coastal scene as representative of Devonshire, and gives predominance to a red sandstone cliff, crowned with fields and trees. Great ingenuity is shown in the wide range of light, colour and perspective effects obtained, despite the semi-geometric basis of composition. Mr. Lampitt is equally successful with his quayside scene at a Cornish fishing village, into which he has introduced human figures on the same lines. The tessellated principle offers new possibilities in poster advertising by reason of its effectiveness when viewed from a distance.

**G.W.R. Ambulance Presentation at Worcester.**—At a smoking concert at the Guildhall, Worcester, on April 29, Mr. J. F. Lean, Principal Assistant to the General Manager, G.W.R., presented awards to ambulance workers in the Worcester Division. Mr. H. J. Peacock, Divisional Superintendent, presided. Among those present was the Mayor of Worcester (Mr. T. Duckworth), who congratulated the Great Western Railway on the service it was rendering to the community through the ambulance movement. Mr. Lean presented the Kilbourne Kay Shield and prizes to the Honeybourne (Advanced) team, the Kilbourne Kay Cup and prizes to the Worcester Traffic team, and prizes to other winning teams in the recent divisional compe-

titions. A large number of efficiency awards for 15, 20, and 25 years' service were distributed, and gold bars for 30 years' efficiency handed to Mr. Waite and Mr. W. Evison.

**Trust of British Transport.**—This trust, which was recently opened for public subscription, has been created for the purpose of enabling a larger circle of investors to take a well-balanced interest in the transport industry. The trust provides a means by which the investor can spread his money over a large number of sound representative companies with the investment of only a relatively small sum. The industry embraces not only the means of physically transporting passengers and goods from one place to another, but also those undertakings which supply the necessary equipment. Investments may be changed to meet changing circumstances, but the managers of the trust are restricted in their choice to those authorised by the trust deed. The first Chairman of Trust of Transport Shares Limited, the company managing the

trust, was the late Sir Philip Nash, and he had associated with him on the board Sir Herbert E. Blain, who has held important positions on the London Underground Railways, and others with knowledge of transport conditions. As recorded in our Personal columns this week, Sir Herbert has now succeeded to the chairmanship of the Trust of Transport Shares Limited.

**Road Accidents.**—The Ministry of Transport return for the week ended May 9 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

	Killed, including deaths resulting from previous accidents		Injured
England	103	(116)	3,701 (4,349)
Wales	8	(7)	150 (199)
Scotland	9	(9)	347 (435)
	120	(132)	(4,198) (4,983)

The total fatalities for the previous week were 133, as compared with 112 for the corresponding period of last year.

## British and Irish Railways Stocks and Shares

Stocks	Highest 1935	Lowest 1935	Prices	
			May 13, 1936	Rise Fall
G.W.R.				
Cons. Ord. ...	55½	44½	48½	—
5% Con. Prefce. ...	124	108	121½	—
5% Red. Pref.(1950) ...	117	106¾	110½	—
4% Deb. ...	118½	108	115½	—
4½% Deb. ...	122	110	118½	—
4½% Deb. ...	129½	118	127½	—
5% Deb. ...	140½	130	140½	—
2½% Deb. ....	82½	68½	78	—
5% Rt. Charge ...	137	128	135½	—
5% Cons. Guar. ...	136¾	120½	131½	—
L.M.S.R.				
Ord. ....	25½	16	24½	—
4% Prefce. (1923) ...	58½	43½	72	—
4% Prefce. ....	87½	73½	88	+½
5% Red. Pref.(1955) ...	107	97¾	107½	—
4% Deb. ....	110½	99½	110½	—
5% Red. Deb.(1952) ...	119½	111½	116½	—
4% Guar. ....	105½	95½	105½	—
L.N.E.R.				
5% Pref. Ord. ...	157½	81½	11½	+¼
Def. Ord. ....	79½	4¾	5½	+½
4% First Prefce. ....	74½	48	70	+½
4% Second Prefce. ....	31½	16½	28	+½
5% Red. Pref.(1955) ...	92½	71	94½	—
4% First Guar. ....	103½	93	103½	—
4% Second Guar. ....	98¾	82½	97½	—
3% Deb. ....	86	75	84½	—
4% Deb. ....	109½	98½	109	—
5% Red. Deb.(1947) ...	118½	106½	112½	—
4½% Sinking Fund Red. Deb.	112½	108	110	+½
SOUTHERN				
Pref. Ord. ....	87½	69½	95	+½
Def. Ord. ....	25½	16¾	24	—
5% Prefce. ....	124	108½	123	+½
5% Red. Pref.(1964) ...	117½	109½	118½	—
5% Guar. Prefce. ....	136½	121½	131½	—
5% Red. Guar. Pref. (1957)	121½	112½	118	+½
4% Deb. ....	116¾	107	114	—
5% Deb. ....	138	130½	138½	—
4% Red. Deb. ....	115	106½	115½	—
1962-67				
BELFAST & C.D.				
Ord. ... ..	9	4	9	—
FORTH BRIDGE				
4% Deb. ....	111½	104½	105½	—
4% Guar. ....	109½	104	105½	—
G. NORTHERN (IRELAND)				
Ord. ... ..	20	7	18½	—¾
G. SOUTHERN (IRELAND)				
Ord. ... ..	57½	14½	59	—
Prefce. ....	50	25½	59¾	—¼
Guar. ....	88¾	51½	88½	—
Deb. ....	86½	70	90½	+½
L.P.T.B.				
4½% "A" ...	130	119¾	125½	—
5% "A" ...	139¾	130	135½	—
4½% "T.F.A." ...	113¾	108	110	—
5% "B" ...	131½	122¾	129	—
"C" ...	109½	91	103	—½
MERSEY				
Ord. ....	23½	9½	26½	—
4% Perp. Deb. ....	100½	93½	97½	—
3% Perp. Deb. ....	75½	67	76	—
3% Perp. Prefce. ....	62	47½	64½	—

\* ex dividend

## British and Irish Traffic Returns

GREAT BRITAIN	Totals for 19th Week			Totals to Date		
	1936	1935†	Inc. or Dec.	1936	1935	Inc. or Dec.
L.M.S.R. (6,917 mls.)	£	£	£	£	£	£
Passenger-train traffic...	424,000	449,000	— 25,000	7,680,000	7,687,000	— 7,000
Merchandise, &c.	512,000	428,000	+ 84,000	8,903,000	8,437,000	+ 466,000
Coal and coke	226,000	187,000	+ 39,000	4,983,000	4,728,000	+ 255,000
Goods-train traffic	738,000	615,000	+ 123,000	13,886,000	13,165,000	+ 721,000
Total receipts	1,162,000	1,064,000	+ 98,000	21,566,000	20,852,000	+ 714,000
L.N.E.R. (6,332 mls.)						
Passenger-train traffic...	278,000	300,000	— 22,000	5,065,000	5,076,000	— 11,000
Merchandise, &c.	323,000	288,000	+ 35,000	6,128,000	5,850,000	+ 278,000
Coal and coke	219,000	199,000	+ 20,000	4,646,000	4,426,000	+ 220,000
Goods-train traffic	542,000	487,000	+ 55,000	10,774,000	10,276,000	+ 498,000
Total receipts	820,000	787,000	+ 33,000	15,839,000	15,352,000	+ 487,000
G.W.R. (3,746 mls.)						
Passenger-train traffic...	178,000	192,000	— 14,000	3,218,000	3,239,000	— 21,000
Merchandise, &c.	192,000	156,000	+ 36,000	3,507,000	3,356,000	+ 151,000
Coal and coke	93,000	93,000	—	2,026,000	1,958,000	+ 68,000
Goods-train traffic	285,000	249,000	+ 36,000	5,533,000	5,314,000	+ 219,000
Total receipts	463,000	441,000	+ 22,000	8,751,000	8,553,000	+ 198,000
(S.R. (2,154 mls.)						
Passenger-train traffic...	268,000	309,000	— 41,000	4,849,000	4,873,000	— 24,000
Merchandise, &c.	63,000	57,000	+ 6,000	1,126,000	1,127,000	— 1,000
Coal and coke	25,000	24,000	+ 1,000	663,000	607,000	+ 56,000
Goods-train traffic	85,000	81,000	+ 4,000	1,789,000	1,734,000	+ 55,000
Total receipts	353,000	390,000	— 37,000	6,638,000	6,607,000	+ 31,000
Liverpool Overhead (6½ mls.)	1,122	1,183	— 61	21,177	21,038	+ 139
Mersey (4½ mls.)	4,189	4,254	— 65	78,355	77,755	+ 600
London Passenger Transport Board	562,200	658,100	— 95,900	24,478,300	24,196,900	+ 281,400
<b>IRELAND</b>						
Belfast & C.D. pass. (80 mls.)	1,960	3,136	— 1,176	34,589	36,375	— 1,786
" " goods	573	458	+ 115	10,195	9,237	+ 958
" " total	2,533	3,594	— 1,061	44,784	45,612	— 828
*Great Northern pass. (543 mls.)	8,900	9,750	— 850	150,930	147,850	+ 3,080
" " goods	9,500	9,300	+ 200	177,950	167,900	+ 10,050
" " total	18,400	19,050	— 650	328,880	315,750	+ 13,130
*Great Southern pass. (2,076 mls.)	31,987	32,895	— 908	522,739	518,470	+ 4,269
" " goods	42,454	40,935	+ 1,519	758,750	718,061	+ 40,689
" " total	74,441	73,830	+ 611	1,281,489	1,236,531	+ 44,958

\* 45th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes  
† 18th week ‡ Jubilee week in 1935.

## CONTRACTS AND TENDERS

John I. Thornycroft & Co. Ltd. has received an order from the Southern Railway for six Trusty six-cylinder petrol-engined vehicles.

### B.A.G.S. Enquiries for Steam Locomotive Parts

The Buenos Ayres Great Southern Railway has made enquiries for the supply of sets of parts for 24 new steam locomotives, comprising main frames, cylinders, motions, wheels, and axles, &c., but excluding boilers.

Whitelegg & Rogers Limited has received an order for 24 Ajax patent steam-operated firedoors to be fitted to the 15-E class locomotives for the South African Railways, now under construction in the works of Henschel & Sohn, Kassel, Germany.

Whitelegg & Rogers Limited has also received an order from Beyer, Peacock & Co. Ltd. for two similar firedoors for Beyer-Garratt locomotives now being built for the Nigerian Railway.

Howell & Co. Ltd. has received an order from the Buenos Ayres Great Southern Railway for 2,000 solid-drawn steel boiler tubes.

### Railcars for Ceylon and India

The English Electric Co. Ltd. has received an order from the Crown Agents for the Colonies for three four-car articulated diesel-electric train units for the 5 ft. 6 in. gauge lines of the Ceylon Government Railways.

The Drewry Car Co. Ltd. has received an order from the Jodhpur Railway Administration for two metre-gauge four-wheeled petrol-driven inspection railcars, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Geo. Spencer Moulton & Co. Ltd. has received an order from the Buenos Ayres Western Railway for 4,100 patent india rubber concentric springs.

The Crown Agents for the Colonies have recently placed the following orders:—

Universal Asbestos Manufacturing Co. Ltd., asbestos cement and roofing materials.

Richard Johnson & Nephew Limited, F. Smith & Co., The Whitecross Co. Ltd., and I.C.I. Metals Limited, copper wire.

Davies & Metcalfe Limited, injectors.

The Vacuum Oil Co. Ltd., lubricating oil.

A. Herbert Limited, machinery for wheelshop.

Ward, Haggas & Smith, sliding, surfacing and screwcutting lathe.

Stewarts and Lloyds Limited and Howell & Co. Ltd., steel tubes.

F. Morton & Co. Ltd., Bain & Co. Ltd. and Dorman, Long & Co. Ltd., structural steelwork.

The Motherwell Bridge & Engineering Co. Ltd., steelwork for viaduct.

Darlington Railway Plant & Foundry Co. Ltd., switches and crossings.

Isca Foundry Co. Ltd., manufacture of switches and crossings.

General Electric Co. Ltd., telephone materials.

Ericsson Telephones Limited, telephone switchboards.

Chloride Electrical Storage Co. Ltd., train lighting cells.

Taylor Bros. & Co. Ltd., tyres and retaining rings.

John Birch & Co. Ltd., universal milling machine.

R. Y. Pickering & Co. Ltd. has received an order, to the inspection of Messrs. Rendel, Palmer & Tritton, for three bogie rail wagons, 43 ft. long, for the Gaekwar's Baroda State Railways.

### Locomotives and Equipment for India

Robert Stephenson & Co. Ltd. has received an order from the Madras & Southern Mahratta Railway administration for five class YB superheated 4-6-2 locomotives and tenders, metre gauge, and one boiler for the same class locomotive, to the inspection of Messrs. Rendel, Palmer & Tritton.

Robert Stephenson & Co. Ltd. has also received an order from the Bengal-Nagpur Railway for two 5-ft. 6-in. gauge four-cylinder compound 4-6-2 superheated mail express locomotives and tenders.

The Vulcan Foundry Co. Ltd. has received orders for a total of nine boilers for the Madras & Southern Mahratta Railway to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton and divided as follows:—seven for GS class 4-8-0, one for YK class 2-6-0, and one for YD class 2-8-2 locomotives.

The Bombay, Baroda & Central India Railway administration has placed the following orders, to the inspection of Messrs. Rendel, Palmer & Tritton: Taylor Bros. & Co. Ltd., 152 pairs of carriage wheels and axles; and Westinghouse Brake & Signal Co. Ltd., seven point machines and eight disc type shunt signals, electrically operated.

The Westinghouse Brake & Signal Co. Ltd. has received orders from the Chinese Government Purchasing Commission, to the inspection of Messrs. Fox & Mayo, for 70 sets of air brake equipment, 900 hose couplings and 850 nipples required for the Canton-Hankow Railway.

The Bombay, Baroda & Central India Railway administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton:—

Stewarts and Lloyds Limited, 3,900 steel boiler tubes.

F. Braby Limited, 658 panel plates.

Nicholson & Fielden, 628 helical springs.

The Madras & Southern Mahratta Railway administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton, as follows:—

S. Commerciale d'Ougree, 1,750 pairs of fish-plates and 45,000 bearing plates.

S. A. Angers des Forges de la Providence, 13,000 tiebars for cast-iron pot sleepers.

Stahl-Union Export Company, 126,000 fish-bolts.

The Bengal-Nagpur Railway administration has placed the following orders:—

Brown Bayley's Steelworks Limited, 108 engine tyres.

Superheater Co. Ltd., superheater elements.

Vulcan Foundry Co. Ltd., engine wheels and axles.

Wm. Beardmore & Co. Ltd., 64 pairs of wheels and axles.

Taylor Bros. Limited, 84 pairs of wheels and axles.

Thos. Firth & John Brown Limited, 200 steel tyres.

The Yorkshire Engine Co. Ltd. has received an order, to the inspection of Messrs. Rendel, Palmer & Tritton, for three boilers for MHS 4-6-0 type locomotives, Madras & Southern Mahratta Railway.

Nasmyth Wilson & Co. Ltd. has received an order from the Bengal-Nagpur Railway administration for six boilers and also for six sets of sanding gear required for F class broad-gauge superheated locomotives.

### Rails and Equipment for China

Guest Keen Baldwins Iron & Steel Co. Ltd. has received orders for 1,850 tons of 43 kilos per metre rails and 110 tons of fish plates from the Chinese Government Purchasing Commission for the Peiping-Hankow and Shanghai-Nanking Railways, to be supplied to the inspection of Messrs. Sandberg.

The Fiat Company, of Turin, has received an order for six Littorina railcars for the Eritrean Railways, and for three similar cars for the Suzzara Railway in Italy. Both types will have two 115 b.h.p. Fiat oil engines and mechanical transmission. The same firm is building two petrol-engined Littorinas for the railways of the U.S.S.R.

Ganz & Company, of Budapest, has received an order from the Egyptian Government Railways for 20 diesel railcars. Further particulars will be found in the DIESEL RAILWAY TRACTION SUPPLEMENT which accompanies this week's issue.

The Chinese Government Purchasing Commission has placed orders with the Earl of Dudley's Round Oak Works Limited for mild-steel rounds for staybolts, and with N. Hingley & Son Ltd. for staybolt iron, all required for the Canton-Hankow Railway and to be supplied to the inspection of Messrs. Fox & Mayo.

The General Electric Co. Ltd. has received a contract from the G.W.R. for 12 months' supplies of Osram lamps.

The Vickers Train Lighting Co. Ltd. has received an order from the G.N.R. (I) for four sets of VI single-battery train electric lighting equipment.

Ailsa Craig Limited has received an order for two 12/16 h.p. twin-cylinder special light weight stationary-type diesel engines from the Quasi-Arc Co. Ltd. The engines are required for Quasi-Arc portable diesel welding sets for railway work.

The Egyptian Ministry of Agriculture is calling for tenders, to be presented in Cairo by June 8, for the supply of light railway tipping wagons, rails, &c. Further details may be obtained from the Department of Overseas Trade.

The L.N.E.R. has placed an order with R. Dunston Limited, of Thorne, for a twin-screw steam tug which will be the first of its type to be built in this country. The vessel will have a pull of 3 tons and a speed of 9 knots. The outstanding feature will be the provision of a Kort nozzle, designed to



## OFFICIAL NOTICES

## Great Southern Railways Company.

## CONTRACTS, 1936.

THE Directors of the Great Southern Railways Company are prepared to receive Tenders for the supply of the undermentioned stores for six and twelve months commencing 1st July, 1936:—

No. of Form	No. of Form
Acid, sulphuric .. 3D	Oils, paraffin, gas and cleaning .. 157
Acetylene, dissolved .. 168	Oils, lubricating .. 159
Axles for locos. .. 102	Oils, gas engine .. 160
Axles for carriages and wagons .. 103	Oils, switch and fuel .. 165
Brass and copper tube, sheet wire, &c. .. 115	Oxygen, compressed 136A
Bricks, fire .. 33A	Pins, split steel taper 144
Canvas for wagon tarpaulins .. 6A	Pins, coupling rod steel .. 167
Carbide of calcium .. 136	Rubber V.B. diaphragms .. 125
Driers, liquid .. 142B	Rubber V.B. sleeves 126
Drills, high speed twist .. 147	Rubber V.B. hose .. 127
Grease for wagon axleboxes .. 158	Rubber V.B. rings and washers .. 128
Handles, tool .. 141	Springs, volute .. 107
Lead, sheet, red and white .. 161	Steel bloom .. 109
Oil, mineral roof lamp .. 154	Tin plates .. 22
	Tubes, steel for boilers .. 153
	Tyres, steel for locos. 104

Forms of Tenders can be obtained on PAYMENT of 6d. each from the STORES SUPERINTENDENT, GENERAL STORES DEPARTMENT, G. S. RAILWAYS, INCHICORE, DUBLIN. Applications for forms by post must be accompanied by Postal Order. STAMPS CANNOT BE ACCEPTED. All inquiries for information should be directed to the Stores Superintendent.

Patterns may be inspected at the GENERAL STORES DEPARTMENT, INCHICORE, on

and after the 15th instant, between the hours of 10.0 a.m. and 4.0 p.m. (except Saturdays).

Tenders must be enclosed in the envelope supplied for the purpose with each Schedule and must be posted so as to be with the undersigned before 5.0 p.m. on WEDNESDAY, the 3rd JUNE, 1936.

The Directors will not consider any Tender unless it is furnished on the Company's Form, and do not bind themselves to accept the lowest or any Tender.

The decision of the Directors will be communicated not later than FRIDAY, 10th JULY, 1936, to those Firms ONLY whose Tenders are accepted.

By Order,  
H. S. COE,  
Secretary.

Kingsbridge Station,  
Dublin.  
May, 1936.

THE ASSAM-BENGAL RAILWAY COMPANY, LIMITED is prepared to receive Tenders for:—

TWO ENGINE TURNTABLES.  
Specifications and Tender Forms may be obtained at the Offices of the Company, 56, Victoria Street, S.W.1. A fee of £1 1s. is charged for each Specification, which cannot be returned.

Drawings may be had at the cost of the tenderer by application to Messrs. Hodges, Bennett & Co. Ltd., 78, Queen Victoria Street, E.C.4.

Tenders must be delivered at the Company's Offices not later than Noon on Thursday, the 28th May, 1936.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,  
W. H. J. GORE,  
Secretary.

PATENTS AND DESIGNS ACTS, 1907 TO 1932. Notice is hereby given that The American Fork & Hoe Company, of 1623, Euclid Avenue, in the City of Cleveland, State of Ohio, United States of America, seek leave to amend the Specification of the Application for Letters Patent No. 442,109 for an invention entitled "Railway Rail Joint Shims." Particulars of the proposed amendment were set forth in No. 2469 of the Official Journal (Patents), published on May 13th, 1936. Any person, or persons, may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, within one calendar month from the date of publication of the said Journal.—M. F. LINDLEY, Comptroller-General.

PATENTS for Inventions, Trade Marks. King's Patent Agency, Ltd. (B. T. King, Registered Patent Agent), Advice, Handbook and Consultations free.—146A, Queen Victoria Street, E.C.4. Phone City 6161. References and experience of the Company and its founder over 50 years.

## Universal Directory of Railway Officials and Railway Year Book

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increase the power of the vessel. The Kort device consists of a tubular arrangement around the propeller, which has the effect of concentrating the thrust of the screw. The tug is intended for service in the railway company's Lowestoft harbour.

## L.M.S.R. Wirral Electrification Contracts

In connection with the Wirral electrification scheme, details of which were given first by THE RAILWAY GAZETTE in the issue of January 17 last, the L.M.S.R. has placed orders for 19 all-steel, three-car, bogie train sets with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., and the Birmingham Railway Carriage & Wagon Co. Ltd. The details of the contract are still under negotiation, but the Metropolitan-Cammell Carriage & Wagon Co. Ltd. will be responsible for all the motor and some of the trailer cars, and the remaining trailer cars will be built by the Birmingham Railway Carriage & Wagon Co. Ltd. In addition to the contract awarded to G. D. Peters & Co. Ltd. for door-operating equipment, recorded in these columns last week, orders have also been placed for train equipment with the British Thomson-Houston Co. Ltd. for 19 sets of 4-motor equipment with roller bearings, and 19 sets of control and heating equipment; and with the Westinghouse Brake & Signal Co. Ltd. for 19 sets of motor-driven air compressors and governors. (Details of the new stock are given in a news article on page 959 of this issue.)

A contract was signed on February 12 by Mr. Tanaka, Business Manager of the Daien Machinery Works, a subsidiary of the South Manchuria Railway, for the supply of 227 metre-gauge wagons for the Tatung-Puchow Railway (N. China).

The L.N.E.R. has placed orders for road motor vehicles as follow:—  
Stewart & Arden Limited, four Morris 8/10 cwt. chassis.

North London Engineering Co. Ltd., building and mounting four parcels van bodies.

Albion Motors Limited, 20 Albion 4-ton F.C. chassis and cabs with platform bodies.

Scammell Lorries Limited, 44 Scammell 3-ton tractor units, six Scammell 6-ton tractor units, one 3-ton rigid pole trailer, and 118 sets coupling gear (3 and 6 ton).

Express Motor & Body Works, two Commer 20-cwt. N.C. chassis with parcels van bodies.

Vauxhall Motors Limited, 21 Bedford 40-cwt. L.W.B. chassis.

G. Westmoreland & Son, building and mounting two platform bodies (long), 13 platform bodies (hinged sides), and six platform bodies (two-portioned hinged sides).

Cranes (Dereham) Limited, 88 3-ton low loading platform trailers (long), eight 3-ton low loading platform trailers (short, special narrow), 20 6-ton standard loading level platform trailers (long), and three 3-ton telescopic pole trailers.

R. A. Dyson & Co. Ltd., two 3-ton cranked frame standard platform trailers (short), and two 6-ton telescopic pole trailers.

Truck & Tractor Appliance Co. (Manchester) Ltd., one 3-ton T.T.A. Dragon detachable semi-trailer with platform body.

LISTER AND BLACKSTONE ENGINEERING ALLIANCE.—By an agreement dated April 21 R. A. Lister & Co. Ltd., of Dursley (Glos.), and Blackstone & Co. Ltd., of Stamford, will in future co-operate. Under the agreement Lister has acquired a substantial holding in the Blackstone firm, and Mr. Percy Lister, Mr. R. B. Lister, and Mr. A. E. Mellerup join Mr. Ernest Blackstone, Mr. Harold Blackstone, and Mr. Tom Price on the board of Blackstone's. Mr. Percy Lister has been appointed Chairman. The two concerns will continue to operate separately, but their association is expected to ensure increased efficiency of production. The firm of Blackstone, founded 99 years ago to make harvesting machinery, is one of the oldest in the British engineering industry. Forty years ago Blackstone's began to manufacture oil engines; these are now the main product. The firm of Lister, founded 69 years ago by the late Sir Ashton Lister, is one of the few surviving family concerns in the country; it is now controlled by the founder's five grandsons. The firm employs over 2,500 men, and has associated or subsidiary companies in the United States of America, Argentine, France, and Belgium. Its products include oil engines, lighting plant, and auto-trucks.

Mr. Sydney H. Morden has recommended business as Morden, McDonald & Co., Engineers and Manufacturers' Agents, at 36-38, Victoria Street, London, S.W.1.

### Railway Share Market

Conditions in the stock and share markets have been comparatively quiet and have not made for increased business in Home Railway stocks. The traffic figures for the past week were regarded as favourable, for, despite the fact that comparison is with Jubilee week of last year, they show a total increase of £116,000. It is quite possible that prices of some of the junior stocks would have responded to the continued encouraging trend in traffics had it not been for the fear of a delay in arriving at a final agreement as to the proposal for partial restoration of the 2½ per cent. wage cut.

Despite the £98,000 gain in the L.M.S. traffics for the past week, the ordinary stock was lowered nearly a point to 24 on Wednesday when news came to hand of possible developments in connection with the wages question. The 1923 and 4 per cent. preference stocks were also

lower at 71½ and 87½ respectively. The £33,000 increase in the past week's traffic figures failed to prevent fractional declines in L.N.E.R. first preference to 69½ and in the second preference to 27. Nevertheless the second preference has been more active as its chances of re-entering the dividend list for the current year are considered in some quarters to be probably better than in the case of Southern deferred or L.M.S. ordinary, but this will, of course, turn on the trend in traffics for the rest of the year.

Southern preferred were lowered nearly a point to 94½ on Wednesday and the deferred went back by ½ to 24. The £37,000 decrease in last week's receipts was apparently regarded as very disappointing in some quarters where it was overlooked that comparison is with the Jubilee week of last year when the company's passenger receipts were stimulated.

Great Western lost part of its recent improvement. London Transport "C" held up well despite the £95,000 decline in the past week's takings as compared with the Jubilee week of last year.

Foreign railway stocks remained out of favour. Those of the Argentine railways were affected by the continued disappointing trend in traffics. B.A. Great Southern was easier as was the 5 per cent. preference, B.A. Pacific was relatively steady, but B.A. Western was fractionally lower at 12½. Central Argentine issues were slightly down; the 6 per cent. notes went back four points to 87½ following news of the new proposals. San Paulo were a point up at 53 on the favourable impression created by the statements at the meeting. Nitrate Rails issues were lower following publication of the annual report. Antofagastas received rather more attention. American railroad stocks were steadier. Canadian Pacific remained somewhat firmer but there was profit-taking in the preference.

### Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1935-36	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date		Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1935		Totals			Increase or Decrease	Highest 1935	Lowest 1935	May 13, 1936	Yield (See Note)		
						This Year	Last Year								
South & Central America.															
Antofagasta (Chili) & Bolivia	834	10.5.36	12,360	+	800	19	£ 252,530	£ 235,200	+	£ 17,330	Ord. Stk.	23	1415½	22	Nil
Argentine North Eastern ..	753	9.5.36	9,489	+	145	45	353,890	332,187	+	21,703	"	7	4	41½	Nil
Argentine Transandine ..	174	Apr., 1936	7,150	+	400	17	26,900	26,300	+	600	A. Deb.	49½	30	47½	8½
Bolivar ..	—	—	—	—	—	—	—	—	—	—	13	5	10	Nil	Nil
Brazil ..	—	—	—	—	—	—	—	—	—	—	14	11	14	39½	Nil
Buenos Ayres & Pacific ..	2,806	9.5.36	98,061	—	2,530	45	3,814,023	3,539,227	+	274,796	Ord. Stk.	101½	47½	8	Nil
Buenos Ayres Central ..	190	25.4.36	891,500	—	£13,400	43	\$4,688,860	\$4,716,700	—	\$27,840	Mt. Deb.	21	10	17½	Nil
Buenos Ayres Gt. Southern	5,084	9.5.36	129,788	—	9,692	45	5,884,997	6,513,530	—	628,533	Ord. Stk.	27	131½	16	Nil
Buenos Ayres Western ..	1,930	9.5.36	53,231	+	4,177	45	2,046,442	2,033,200	+	13,242	"	24	10	13	Nil
Central Argentine ..	3,700	9.5.36	100,911	—	39,169	45	5,332,076	5,431,291	—	99,215	"	177½	7	10	Nil
Do. ..	—	—	—	—	—	—	—	—	—	—	9	31½	4	61½	Nil
Cent. Uruguay of M. Video	273	2.5.36	12,234	+	1,179	44	489,736	607,064	—	117,328	Ord. Stk.	8½	3	4½	Nil
Do. Eastern Extn.	311	2.5.36	2,315	+	61	44	90,416	84,953	+	5,463	"	—	—	—	—
Do. Northern Extn.	185	2.5.36	1,906	+	501	44	63,994	48,371	+	15,623	"	—	—	—	—
Do. Western Extn.	211	2.5.36	788	+	283	44	38,704	33,779	+	4,925	"	—	—	—	—
Cordoba Central ..	1,218	9.5.36	27,730	—	1,350	45	1,253,200	1,261,950	—	8,750	Ord. Inc.	4	1	2	Nil
Costa Rica ..	188	Feb., 1936	14,640	—	562	35	106,919	131,069	—	24,150	Stk.	35	30	36	59½
Dorada ..	70	Mar., 1936	12,900	+	1,000	13	35,500	33,400	+	5,100	1 Mt. Db.	103½	102½	104½	5½
Entre Rios ..	810	9.5.36	10,429	—	877	45	482,078	548,603	—	66,525	Ord. Stk.	15	61½	8½	Nil
Great Western of Brazil	1,082	9.5.36	6,300	—	100	19	165,300	174,400	—	9,100	Ord. Sh.	1½	—	1½	Nil
International of Cl. Amer.	794	Mar., 1936	\$569,809	+	\$100,752	13	\$1,563,107	\$1,307,612	+	\$255,495	"	1½	—	1½	Nil
Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	—	—	12	5½	1½	Nil	Nil
La Guaira & Caracas ..	223	Apr., 1936	4,415	—	545	17	17,375	15,500	+	1,875	Stk.	8½	8	8½	Nil
Leopoldina ..	1,918	9.5.36	12,724	—	388	19	326,029	313,467	+	12,562	Ord. Stk.	8½	21½	7	Nil
Mexican ..	483	7.5.36	\$217,100	—	\$12,700	18	\$4,710,600	\$4,406,800	+	\$303,800	"	1½	1½	1½	Nil
Midland of Uruguay ..	319	Mar., 1936	7,747	—	1,449	39	64,059	91,386	—	27,327	"	112	11	112	Nil
Nitrate ..	401	30.4.36	5,037	—	2,735	17	53,643	49,694	—	3,951	Ord. Sh.	64½	42½	2½	Nil
Paraguay Central ..	274	9.5.36	\$2,770,000	+	\$1,067,000	45	\$97,751,000	\$51,287,000	+	\$46,464,000	Pr. Li. Stk.	80½	66	77	71½
Peruvian Corporation ..	1,059	Apr., 1936	83,397	—	15,092	43	786,623	625,461	+	161,162	Pref.	108½	67½	12	Nil
Salvador ..	100	2.5.36	£19,950	—	£5,550	44	£867,396	£935,852	—	£68,456	Pr. Li. Db.	65	61	65	71½
San Paulo ..	153½	3.5.36	27,200	—	7,072	18	513,000	393,356	+	119,644	Ord. Stk.	80	35	52½	4½
Taltal ..	164	Apr., 1936	2,745	—	1,755	43	35,493	31,385	+	4,110	Ord. Sh.	111½	111	1	10
United of Havana ..	1,353	9.5.36	27,869	+	4,137	45	1,065,917	1,055,904	—	10,013	Ord. Stk.	31½	1	3	Nil
Uruguay Northern ..	73	Mar., 1936	921	—	93	39	7,288	9,835	—	2,547	Deb. Stk.	41½	215½	41½	Nil
Canada.															
Canadian National ..	23,648	7.5.36	693,457	+	91,454	18	11,757,765	11,078,512	+	679,253	Perp. Dbs.	78½	52½	67½	51½
Canadian Northern ..	—	—	—	—	—	—	—	—	—	—	103½	93	101½	315½	Nil
Grand Trunk ..	—	—	—	—	—	—	—	—	—	—	141½	84	12½	Nil	Nil
Canadian Pacific ..	17,237	7.5.36	511,400	+	80,800	18	8,484,200	7,715,600	+	768,600	Ord. Stk.	—	—	—	—
India.															
Assam Bengal ..	1,329	20.4.36	33,045	+	2,218	3	64,087	64,001	—	86	Ord. Stk.	92½	77½	85½	3½
Barsi Light ..	202	20.4.36	3,758	—	397	3	7,920	8,310	—	390	Ord. Sh.	105	77½	72½	6½
Bengal & North Western ..	2,112	20.4.36	82,069	+	7,432	3	162,277	151,960	+	10,317	Ord. Stk.	301½	291	309½	5½
Bengal Doors & Extension	161	10.4.36	2,596	—	865	1	2,596	3,461	—	865	"	127½	122	125½	59½
Bengal-Nagpur ..	3,268	10.4.36	173,625	—	5,459	1	173,625	179,084	—	5,459	"	105	100½	102½	37½
Bombay, Baroda & Cl. India	3,072	30.4.36	289,800	+	39,525	4	852,225	726,900	+	125,325	"	115¼	110	112½	59½
Madras & Southern Mahratta	3,230	20.4.36	173,175	+	11,562	3	332,925	310,170	+	22,755	"	128½	113½	115½	7½
Rohilkund & Kumaon ..	572	20.4.36	18,225	+	925	3	37,235	36,069	+	1,166	"	294	262	300½	59½
South India ..	2,531	20.4.36	114,473	—	3,734	3	228,927	231,527	—	2,600	"	119½	104½	106½	71½
Various.															
Beira-Umtali ..	204	Feb., 1936	61,814	+	2,183	21	316,206	305,135	+	11,071	—	—	—	—	—
Bilbao River & Cantabrian	15	Apr., 1936	1,385	—	363	17	6,062	7,150	—	1,088	—	—	—	—	—
Egyptian Delta ..	622	20.4.36	5,524	+	47	3	11,431	11,033	+	398	Prf. Sh.	2	15½	1½	51½
Great Southern of Spain ..	104	2.5.36	360	—	1,118	18	19,726	34,061	—	14,335	Inc. Deb.	3½	2	3½	Nil
Kenya & Uganda ..	1,625	Feb., 1936	245,527	+	26,405	9	478,026	459,598	+	18,428	—	—	—	—	—
Manila ..	—	—	—	—	—	—	—	—	—	—	B. Deb.	48	36	44½	7½
Mashonaland ..	913	Feb., 1936	98,894	—	6,317	21	509,798	569,289	—	59,461	1 Mg. Db.	104½	100	102½	4½
Midland of W. Australia ..	277	Mar., 1936	12,915	+	910	39	124,864	122,226	—	2,638	Inc. Deb.	98½	93	94½	59½
Nigerian ..	1,905	31.3.36	58,785	+	32,541	52	1,943,972	1,993,557	—	49,585	—	—	—	—	—
Rhodesia ..	1,538	Feb., 1936	179,001	—	769	21	935,446	932,189	+	3,257	4 p.c. Db.	105½	101	104½	31½
South African ..	13,250	18.4.36	531,491	+	2,172	3	1,525,856	1,111,356	+	414,500	—	—	—	—	—
Victoria ..	4,728	Dec., 1935	866,995	—	3,320	26	4,826,292	4,751,974	+	74,318	—	—	—	—	—
Zafra & Huelva ..	112	Mar., 1936	9,570	—	1,537	13	30,751	32,962	—	2,211	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1p.

† Receipts are calculated at 1s. 6d. to the rupee. ‡ Ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.

# Diesel Railway Traction

## Irish Railcar Practice

THE two triple-articulated diesel trains just set to work on the Belfast-Lisburn suburban service on the Great Northern Railway of Ireland form almost a culmination of steady development over a period exceeding four years. Beginning with two trial cars of rather cumbersome design, the Great Northern soon evolved a design all its own, which by its simplicity and soundness has given remarkably good service at a low overall cost. These are the familiar vehicles embodying a 96 or 102 b.h.p. Gardner oil engine, a Walker power bogie, and a body and chassis built at the Dundalk works of the railway company. The car working over the Bundoran branch (see issue of this Supplement for November 30, 1934) has been making an annual mileage of 55,000 at an operating cost of only 2.2d. per mile, made up of 1.5d. per mile drivers wages; 0.4d. fuel and lubricant; and 0.3d. maintenance. However, to this must be added the wages of the guard, which brings up the cost per mile to approximately 3½d. Even this low figure is equalled on the County Donegal Railways with the 74 b.h.p. railcars with the same make of engine and power bogie. The running costs of the two cars put into traffic in 1931 have averaged 2.2d. per mile including maintenance and a heavy overhaul, and the gross cost including all capital charges is scarcely 4d. per mile.

## Egyptian Railcar Order

TWENTY further Ganz diesel-mechanical railcars have been ordered by the Egyptian Government for service on the State Railways. This order appears to have been prompted by the desirability of replacing the steam train service on the Cairo (Bab-el-Louk)-Helwan line, where a greatly augmented service is anticipated as soon as the Bab-el-Louk to Sayda-Zenab section is doubled. It is surprising and encouraging that the Egyptian authorities have already felt the benefits of diesel traction, for the original Ganz units reached Egypt only last September, and the difficulties of operation are by no means light in view of the exceptional amount of sand found on the lines. Some of the Ganz cars already in operation (see the issue of this Supplement for September 6, 1935) have been working suburban services on the Helwan line and they attracted so much traffic, principally from the remaining steam trains it must be admitted, that it was found necessary to convey only first class passengers. The present cars run solo and operate at speeds up to 65 m.p.h., but if the new vehicles are to be apportioned to the Helwan line it may be that their gear ratio will be altered to give a lower maximum speed, and the trailer haulage stipulated.

## The North Sunderland Railway

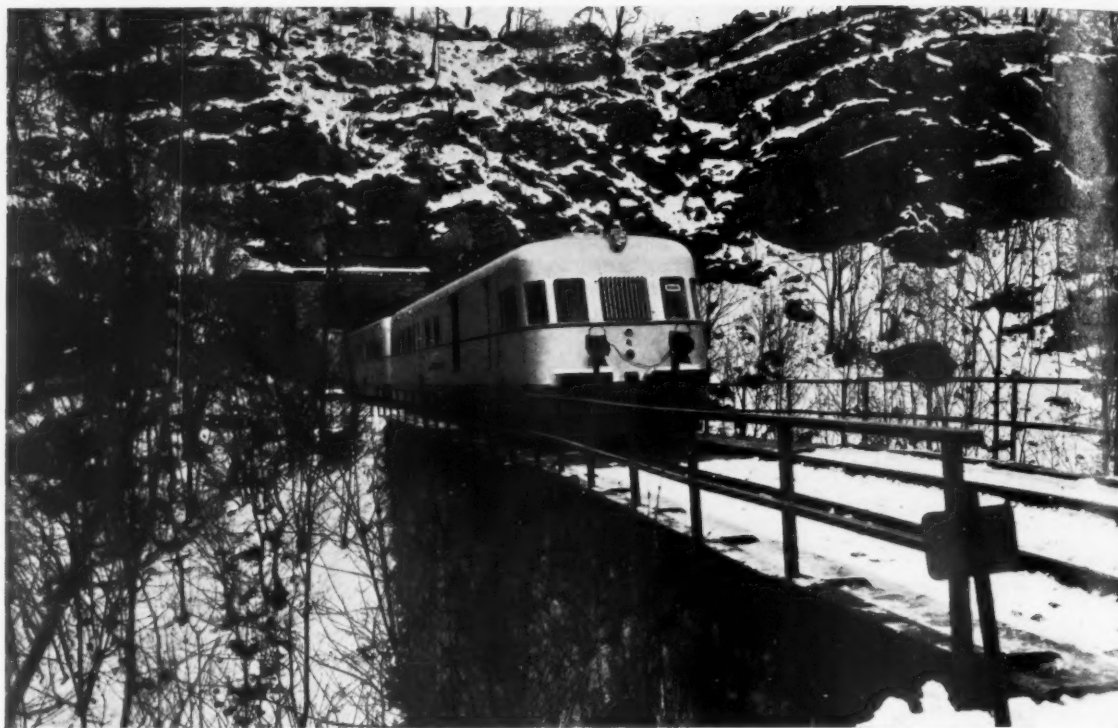
IN our issue of August 10, 1934, we described the 90 b.h.p. Armstrong-Saurer oil-electric locomotive which had been acquired by the North Sunderland Railway at the beginning of that year after the unit had put in a month or two of trial service. Although a small steam tank locomotive is held in reserve, the diesel unit normally operates all the traffic, and the North Sunderland may therefore claim to be the first completely dieselised railway in this country, and among the very first in the world.

The line is merely 4½ miles long, but at the time we described it the locomotive had completed a mileage of over 6,000 in the first five months of its service. The monthly mileage has now increased to about 1,460 and the annual mileage to about 17,500. Since going into operation the aggregate mileage to the end of 1935 was 37,928, corresponding to an availability of virtually 100 per cent. As we indicated in our article in 1934, the railway company anticipated a yearly saving of approximately £300 by the use of the diesel locomotive, a sum which means a great deal to so small a line. Actually the saving amounts to about £333 a year, for the operating cost of the diesel locomotive is 3.88d. a mile including maintenance compared with the 8.8d. of the previous steam locomotive over the years 1931-33. Assuming interest at 5 per cent. on the capital cost of £1,950 and a life of 20 years the gross operating cost for a mileage of 17,500 a year is about 6½d. per mile. This shows in striking fashion how necessary it is to build up a big mileage if the capital charges of the diesel unit are to be kept down. Nevertheless, even in this case where the mileage is low, the low overall operating costs and the high standard of availability are a tribute alike to the builders and to the possibilities of diesel units, while to the railway itself, never particularly prosperous, the locomotive must have been a Godsend. It is interesting to note the proportions of the various items in the cost sheet. Of the operating charges, no less than 53 per cent. was accounted for by the wages of the one driver, who acts also as a cleaner and running shed fitter, and 23 per cent. for the fuel, a high proportion this, but due more to the low value of other items rather than to a high consumption. The lubricating oil bill was 5 per cent. of the total; the maintenance and repairs 14 per cent.; and miscellaneous stores 5 per cent. Of the gross operating cost the aggregate of the above details came out at 60 per cent. and the capital charges at 40 per cent.

## Britain Losing Big Orders

WITHIN the Empire and in countries where British capital predominates, British builders hitherto have secured much of the railway business, but recently large orders for diesel railcars have gone elsewhere. The latest case is the 20 vehicles just ordered from Ganz by the Egyptian Government, and this order follows the delivery of 34 cars to Argentina by the same firm. It has taken scarcely 18 months for these 34 cars to be delivered, and quick delivery forms one of the main reasons why orders go to the Continent. In Spain, where at one time British prospects were bright, owing to the good performance of the early Beardmore units, French, Italian, and German firms have stepped in and secured the co-operation of Spanish firms, with the result that they have the Spanish market in their pockets. Rhodesia, Brazil, and India have placed orders for diesel units on the Continent, despite long trade associations in this country. British manufacturers do not look kindly upon offers of coffee beans or silk stockings in exchange for their heavy engineering products, nor are they keen to accept cash payments over a number of years. But as these considerations, along with quick delivery, are taking orders away, it is obvious that the present methods of business must be changed if British firms interested in diesel traction are to make headway.





*Two of the Ganz railcars for the standard gauge lines of the Argentine Government Railways*

## Large Scale Introduction of Railcars in Argentina

*The State Railways now have in service 29 metre gauge cars with a top speed of 50 m.p.h. and two standard gauge and three broad gauge cars with a top speed of 60 m.p.h.*

AT the end of 1934 the Argentine State Railways placed an order with Ganz & Co. for 16 diesel railcars, and a short time later this was increased to a total of 34 cars divided between metre, 4 ft. 8½ in., and 5 ft. 6 in. gauge types. The whole batch has now been shipped to Argentina and the cars are working over the routes indicated on the accompanying map. The three broad gauge cars were shipped to Puerto Deseado, as they operate on the isolated line from that port to Colonia Las Heras; the metre gauge cars were landed at Buenos Aires and ran on their own wheels to their appointed sheds, and the standard gauge vehicles were taken up the river from Buenos Aires to Ibicuy and then ran on their own wheels to the Diamante line. All the cars are of the double-bogie type with one 240 b.h.p. oil engine, and in appearance are not dissimilar to the Ganz cars working in Hungary and Egypt.

The standard and broad gauge cars are each of one type, the former numbering two and the latter three, but the 29 metre gauge cars are divided into six types designated *a*, *b*, *c*<sub>1</sub>, *c*<sub>2</sub>, *d*, and *e*. The floor plans of all the metre gauge cars are shown to the same scale in one of the drawings accompanying this article. The type *a* car is intended for long distance work and has two de luxe compartments capable of being transformed into sleeping compartments; one first class compartment with 24 seats; a second class compartment with 44 seats; two lavatories and two toilet rooms; and a driving position at each end. Normally, these cars operate with a type *e* railcar coupled

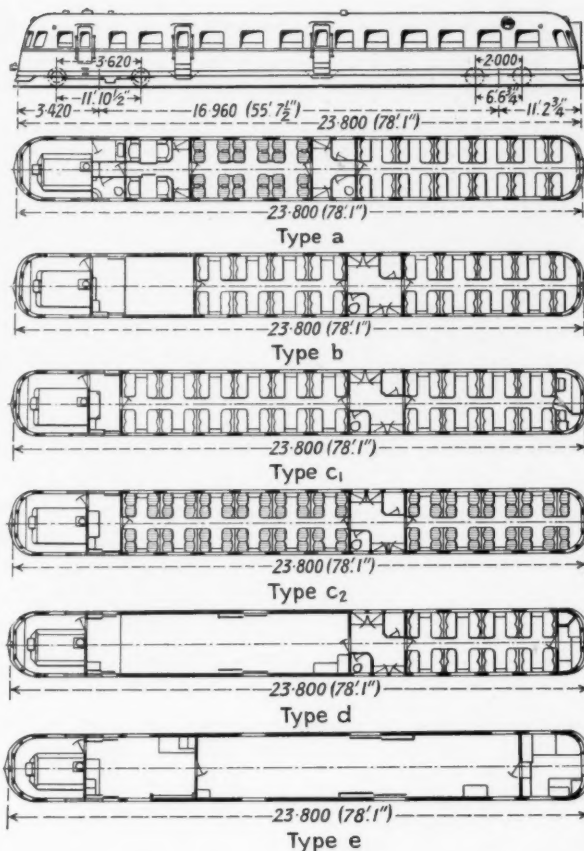


*First class saloon of metre gauge railcar*

to them, and the combined unit can be operated from either end. The type *e* car has a driving position at one end only, so that it must be marshalled always in the same way; it is a combined mail, luggage, and kitchen car, the mail compartment having an area of 118 sq. ft. and the luggage space an area of 355 sq. ft. If desired, the type *e* car can run alone under its own power.

Local trains are being operated by the type *b* railcar, which has one driving compartment. Provision has been made in the construction for the fitting of a small driving compartment at the other end, with the minimum of alteration, should this feature be thought necessary in future, and extra sets of control equipment have been ordered. The two passenger saloons contain a total of 68 seats, and there are also lavatories, toilet rooms, and a baggage compartment. The cars of types *c*<sub>1</sub> and *c*<sub>2</sub> are working in suburban service, the former having 82 seats and two driving compartments, and the latter 84 seats and one driving position. Both classes have lavatory accommodation and a small amount of baggage space. A kitchen, a large baggage space and a relatively small number of seats (32 second class) are incorporated in the type *d* car, which is used for branch lines where the passenger traffic is not very great, but where parcels and light goods traffic must be dealt with expeditiously.

The standard gauge cars are classified as *f*<sub>1</sub> and the broad gauge cars as *f*<sub>2</sub>; the internal layout of both is almost the same (see accompanying drawings), both having one driving position; one first class and one second class saloon; a small kitchen; and the usual lavatory and luggage accommodation. Despite the various types of cars there is a certain uniformity in the layout of the windows and doors, and the general construction of the bodies, the lighting, ventilating, seating, and electro-pneumatic control is the same for all classes except the de luxe cars of type *a*, which have air-conditioning of



Diagrams of the six types of metre gauge diesel cars now running on the Argentine State Railways



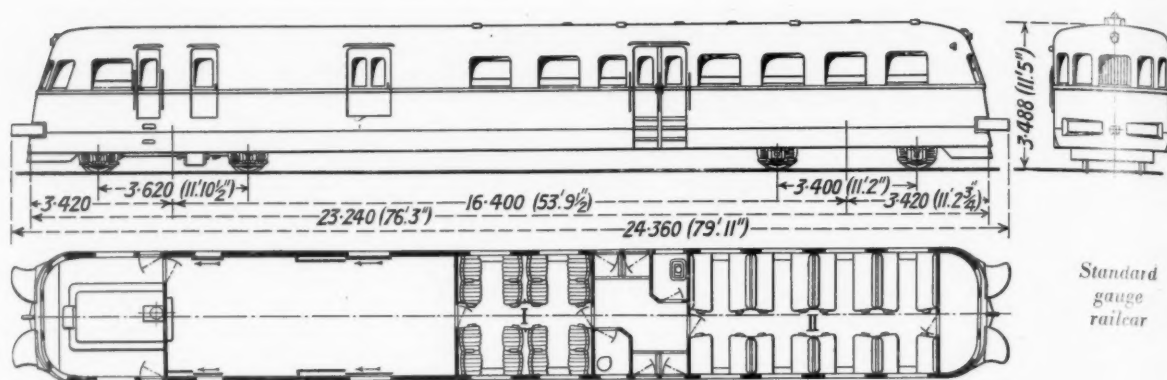
Lines of the Argentine State Railways over which the Ganz railcars are now at work

the mechanically-driven Ganz type as supplied to the railcars of the Egyptian State Railways and described in the issue of this Supplement for September 6, 1935. This and all the other special types of equipment were tried out first on the standard gauge cars, the construction of which was pushed forward rapidly so that they could be tested on the Hungarian State Railways before the metre and broad gauge cars were completed.

#### Mechanical Portion

Chrome steel with a tensile strength of 32-38 tons per sq. in., a yield point of 22½-25 tons, and an elongation on ten times the diameter of 21-19 per cent., has been used for the body framing and underframing which are entirely welded to form a single structure. This chrome steel resists corrosion, and may be stressed safely up to about 7½-8 tons per sq. in. The main longitudinals are formed of channel sections, but where the continuity is interrupted by the wide entrance doors the frame is made of deep steel plate suitably stiffened and braced in a transverse direction.

Alfol insulation is applied to the sides of the body between the outer steel panels of 2 mm. plate and the inner mahogany panels. The outer panels are electrically-welded to the frame pillars and are painted a silver colour with a metallic lustre; the steel roof sheet is covered on the outside with a coating of zinc and two coatings of aluminium. The floor is of plywood, covered with a layer of cork and another of linoleum. The walls of the kitchens are lined with aluminium, and the kitchens them-



selves are equipped with a refrigerator, gas cooker, plate rinser, a working table, and the usual cupboards and shelves. Meals from the kitchen are served to small tables between the seats. Electric lighting at a tension of 24 volts is fitted to all types of car, and is obtained from a lighting generator driven from the main engine. Ventilation, except in the type *a de luxe* cars is effected by fans in the ceiling. Air and electric horns and two searchlights are fitted to all cars, and Argentine standard draw-gear is provided on all cars except those metre-gauge units which are fitted with multiple-unit control.

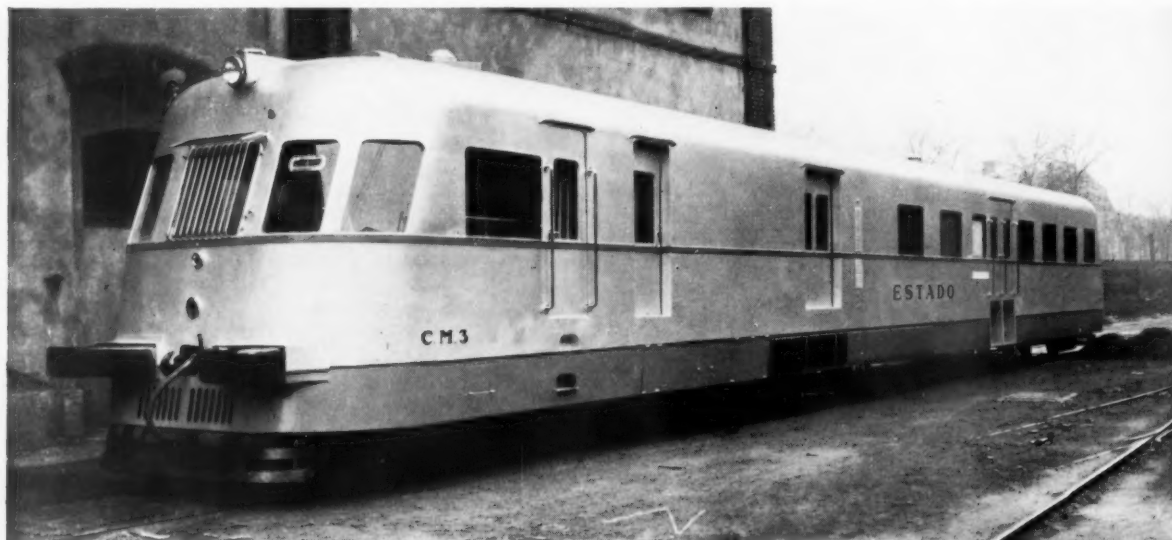
The engine-carrying bogies of the standard and broad gauge vehicles are of the same design as those of the Hungarian and Egyptian cars, the full details of which may be gathered from pp. 396-7 of the September 6, 1935, issue of this Supplement. They have no separate bolster, but embody a triplex springing arrangement and the use of rubber pads at numerous points. As the driving gear is somewhat shorter, the bogie wheelbase has been reduced by 1 ft. 1 in. to 11 ft. 10 in. A certain difficulty was encountered in the design of the driving bogies for the metre gauge railcars in that the restricted width did not leave sufficient room for the crankcase to be dropped between the wheels. The engine therefore was mounted at a higher level than usual and extra gears inserted between the crankshaft and the gearbox in order to bridge the difference in height. Electrically welded construc-

tion was adopted for the chrome steel bogie frame structure. The axles of both driving and trailing bogies are carried on S.K.F. roller bearings.

All the cars are braked by air pressure through a Westinghouse type of control device, and two cast iron blocks are applied to each wheel through compensated rigging. With two or three cars coupled in multiple-unit the air brakes of all can be applied from any driving position. Hand brakes are fitted in each driving position and act on the adjacent bogie.

#### Motive Power

The Ganz-Jendrassik engine is a development of the 220 b.h.p. unit used in the Hungarian *Árpád* and Egyptian cars. The main difference is an increase of 20 mm. in the stroke which has increased the power by 9 per cent. In this present engine the six cylinders have a bore of 170 mm. and a stroke of 240 mm. (6.7 in. by 9.5 in.); the continuous rating is 240 b.h.p. at 1,250 r.p.m. and the maximum 300 b.h.p. at 1,450 r.p.m. The weight is about 5,000 lb., equivalent to 20.7 lb. per b.h.p. on the continuous rate and 16.6 lb. at the top rating. The cylinders are cast in pairs and the blocks bolted to the one-piece aluminium alloy crankcase. The cylinder heads also are cast in pairs and contain a pre-combustion chamber. Nickel-chrome-molybdenum steel is used for the six-throw seven-bearing crankshaft and light metal



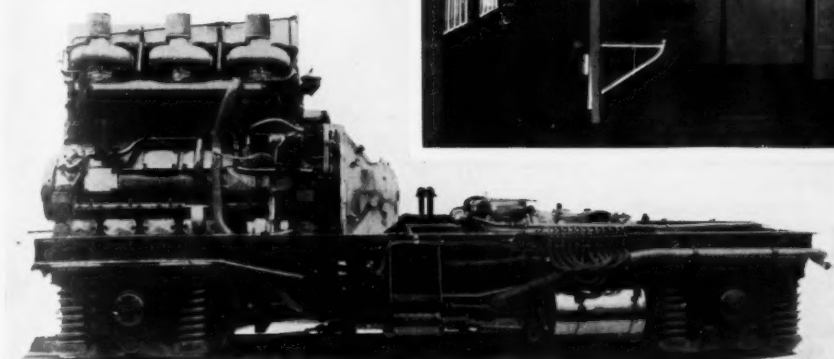
275 b.h.p. 40-tonne Ganz diesel railcar for the 4 ft. 8 1/2 in. gauge lines of the Argentine State Railways



Right: Interior of luggage compartment of one of the two 4 ft. 8½ in. gauge diesel railcars



Left: Bogie for metre gauge cars of Argentine State Railways showing 240 b.h.p. Ganz engine and four-speed gearbox



for the pistons. Balance weights are secured to prolongations of the crankwebs. Fuel is supplied to the nozzles by a Jendrassik fuel pump.

A double-walled and lined aluminium casing encloses the engine where it projects through the engine room floor, and forms an effective heat and noise insulation. The circulating water is cooled in radiators at each side below the car floor, and their fans are driven mechanically from the engine through long shafts. Starting is effected by two motors mounted on the engine and supplied with current from a storage battery which also provides the current for the car lighting. The engine (and primary reduction gear in the metre-gauge cars) is mounted as one unit on the bogie framing at four points through the intermediary of rubber pads.

The transmission consists of a four-speed gearbox situated just behind the bogie pivot, and cardan shafts leading thence to bevel drives on each axle of the bogie. Compared with the previous Ganz cars there are two important modifications in the transmission system fitted

to the Argentine railcars. In the first place, the reversing gear instead of being housed with the main clutch in a steel casing bolted to the engine crankcase, is contained in the light metal gearbox itself and forms the final train of wheels through which the torque is transmitted to the cardan shafts. As before, each of the gear-changing wheels in the box has its own clutch, actuated through servo motors by compressed air.

The second modification is an improvement in the control which ensures that during the engagement of the clutches the servo motor which puts the first speed in gear does not receive the full pressure required for the frictional absorption of the whole torque, and it is only when synchronism between the rotational speeds of the two groups has been established that the air pressure rises to the necessary degree. In the special starting position of the gearbox control lever the air is throttled automatically to about 20 lb. per sq. in. before admittance to the servo motor, and full pressure is gained only when the lever is definitely in the gear position.

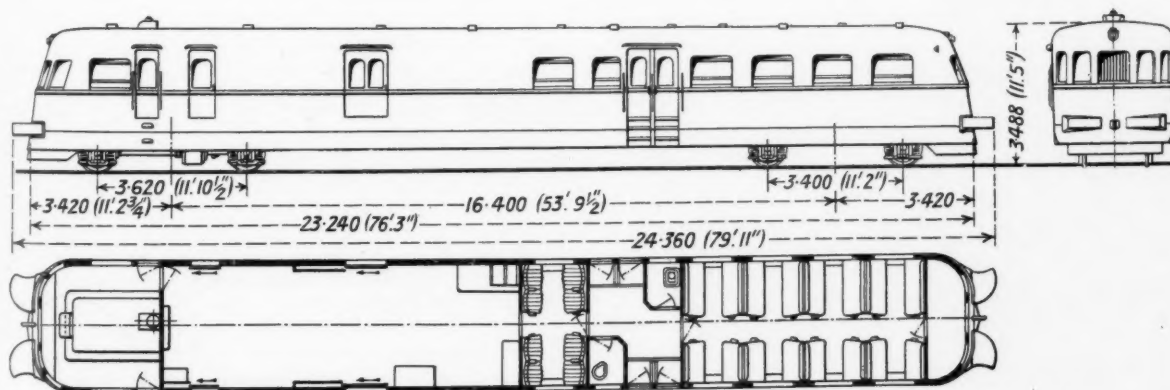


Diagram of 240 b.h.p. 40-tonne Ganz railcar for the 5 ft. 6 in. gauge lines of the Argentine State Railways

## TRANSMISSIONS FOR DIESEL LOCOMOTIVES AND RAILCARS

*The Minerva Pre-Synchronising Gearbox*

By STUART MIALL, B.Sc.

ONE of the disadvantages of the three- and four-speed gearboxes standardised on the automobiles of about ten years ago, was the inevitable interruption of the drive during a change from one speed to the next. After declutching and moving the gear lever into the neutral position, the driver had either to wait for the free member of the clutch to lose speed, or deliberately to re-engage it, and accelerate it, before attempting to engage the next gear. In the modern synchromesh automobile gearbox the process of synchronisation is hastened, and carried out to perfection, by an initial frictional contact between the dogs that have finally to engage one another. Even so, the synchronisation takes up too much valuable time. The parts which are rotating too rapidly, or too slowly, cannot be instantaneously checked or accelerated—a fact which is revealed by the possibility

of grating the dogs of even a synchromesh gearbox on one another by the over-hasty manipulation of the gear lever. The gearbox about to be described, and portrayed diagrammatically in Fig. 1, obviates the need for pauses in the drive while dog synchronisation is effected. The dog for the new gear is synchronised and fully engaged before the drive by the operating gear has to be interrupted. Then by a rapid transference from one friction clutch to another, the drive through the old gear is broken and that through the new gear is established.

In Fig. 1, which shows the four-speed Minerva gearbox, A is the input shaft directly coupled to the engine. Constantly in mesh with gearwheel P on this shaft are the two gearwheels P' and P'' which are integral with the outer members of the two friction clutches E. Only one clutch can be engaged at a time, the one marked  $\frac{1}{3}$  being in use when the drive is through 1st and 3rd speeds, and the one marked  $\frac{2}{4}$  being in use during 2nd and 4th speed operation. The output shaft of the gearbox is Z, and when clutch E $\frac{1}{3}$  is engaged this is driven via either gears G $\frac{1}{3}$  G $\frac{1}{4}$  or gears G $\frac{2}{3}$  G $\frac{2}{4}$ . Gears G $\frac{1}{3}$  and G $\frac{2}{3}$  are integral with shaft A $\frac{1}{3}$  and gears G $\frac{1}{4}$  G $\frac{2}{4}$  are made integral with shaft Z by a sliding dog M $\frac{1}{3}$  of the synchromesh type. This is moved to the left for 1st speed engagement. It is shown in the intermediate or neutral position. When clutch E $\frac{2}{4}$  is engaged shaft Z is driven via either gears G $\frac{2}{3}$  G $\frac{2}{4}$  or gears G $\frac{1}{3}$  G $\frac{1}{4}$ . Gears G $\frac{2}{3}$  G $\frac{2}{4}$  are integral with shaft Z and gears G $\frac{1}{3}$  G $\frac{1}{4}$  are made integral with shaft A $\frac{1}{3}$  by a sliding dog M $\frac{2}{4}$ , also of the synchromesh type. This is moved to the left for 2nd speed engagement and to the right for 4th speed engagement. It is shown in the intermediate or neutral position.

When the vehicle is accelerated through the gears the sequence of operations, starting from the conditions shown in Fig. 1 (both dogs in neutral and both clutches engaged) is:—

(1a) Disengagement of clutch E $\frac{1}{3}$  and movement to left of dog M $\frac{1}{3}$ . The latter slides the whole way at once if shaft A $\frac{1}{3}$  is initially at rest.

(1b) Engagement of clutch E $\frac{2}{4}$  and simultaneous acceleration of engine. The vehicle moves off in 1st speed.

(2a) Pre-synchronisation and pre-engagement of 2nd speed by disengagement of clutch E $\frac{2}{4}$  and subsequent movement of dog M $\frac{2}{4}$  to the left. The latter moves into frictional contact with the mating dog on G $\frac{2}{3}$  without hesitation, and, after a pause, it slides into positive engagement therewith, shaft A $\frac{1}{3}$  being free to assume any speed determined by the speed of Z and the ratio G $\frac{2}{3}$  to G $\frac{2}{4}$ .

(2b) Disengagement of clutch E $\frac{1}{3}$  followed immediately by the withdrawal of dog M $\frac{1}{3}$  and by the simultaneous engagement of clutches E $\frac{1}{3}$  and E $\frac{2}{4}$ . The engine speed is reduced by the imposition upon it of 2nd speed conditions, and the acceleration continues in the new gear after an imperceptible break.

(3a) Pre-synchronisation and pre-engagement of 3rd speed by disengagement of clutch E $\frac{1}{3}$  and subsequent movement of dog M $\frac{1}{3}$  to the right. The latter moves into frictional contact with the mating dog on G $\frac{1}{3}$  without hesitation, and, after a pause, it slides into positive engagement therewith, shaft A $\frac{1}{3}$  being free to

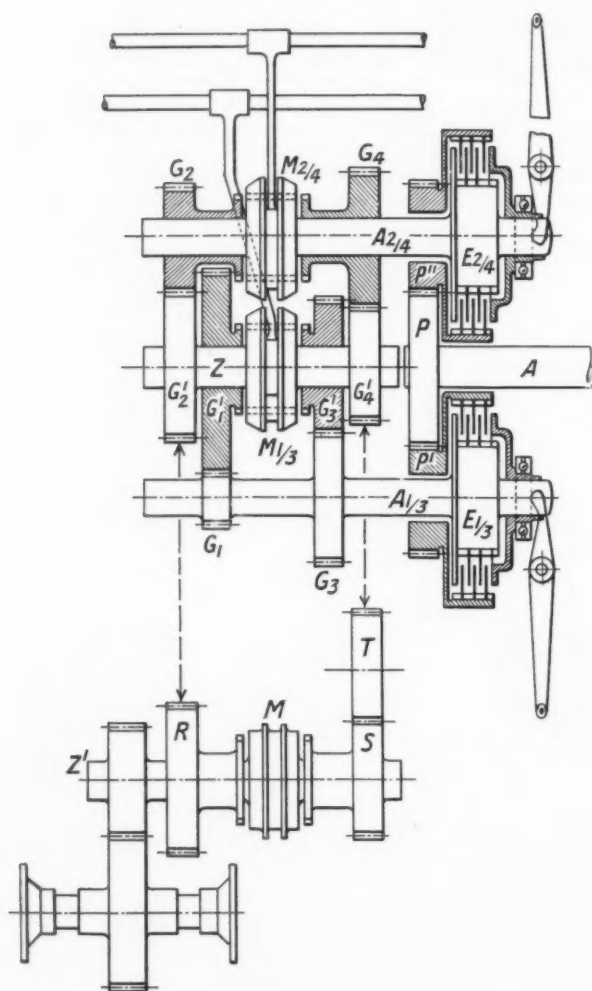
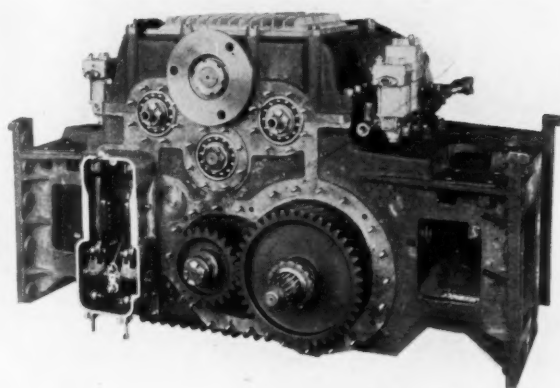


Fig. 1.—Diagrammatic section of four-speed Minerva pre-synchronising gearbox

Right: Fig. 2—Layshafts of four-speed Minerva gearbox. (Clutches on the right)



Below: Fig. 3—General view of Minerva gearbox showing the de-clutching cylinders and their electro-valves, and the gearbox specially prolonged for bolting to the bogie frame structure



assume any speed determined by the speed of  $Z$  and the ratio  $G'_3$  to  $G_3$ .

(3b) Disengagement of clutch  $E_3$  followed immediately by the withdrawal of dog  $M_3$  and by the simultaneous engagement of clutches  $E_2$  and  $E_1$ . The engine speed is reduced by the imposition upon it of 3rd speed conditions and the acceleration continues in the new gear after an imperceptible break.

(4a) Pre-synchronisation and pre-engagement of 4th speed.

(4b) Transfer of load from clutch  $E_3$  to clutch  $E_2$ .

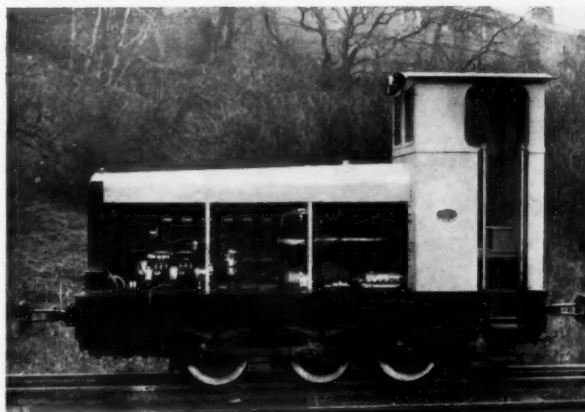
The description of the change from 3rd to 4th speed has been abbreviated as it is like the two preceding changes. The output shaft  $Z$  is geared via either  $G'_2$  and  $R$  or  $G'_4$ ,  $T$ , and  $S$  to another shaft  $Z'$ . Wheels  $R$  and  $S$  run freely on shaft  $Z$ , but can be made integral with it by the sliding dog  $M$ . Opposite directions of rotation are given to shaft  $Z$  by right and left hand positions of  $M$  so that all four speeds are available for backward as well as forward movement of the vehicle.

Control of the Minerva gearbox is effected by eight pneumatic cylinders with electrically operated valves. Each of the dogs  $M_1$ ,  $M_2$ , and  $M$  has a pair of cylinders to actuate it, and each of the clutches  $E_1$  and  $E_2$  is operated by a single cylinder. The control is simple and practically foolproof and the remote control of several boxes simultaneously can be very easily contrived. Provision is made for ensuring that clutch  $E_1$  is engaged very gradually when the vehicle starts off in 1st speed. Also, removable handles are provided for the manual operation of dogs  $M_1$  and  $M$  and of the clutch  $E_1$  in the event of failures in the air or electricity supplies. This ensures that 1st speed operation in either direction is obtainable should the servo control fail at any time.

Although the foregoing description relates to a box with only four gears, it is possible, with two friction clutches, to obtain the benefits of pre-synchronisation with a greater number of gears, and a six-speed Minerva box is available, this being similar in design to the box of Fig. 1 and as easily operated.

## Narrow-Gauge Diesel Locomotives for Mexico

During the past few years the Drewry Car Co. Ltd. has received constant repeat orders from the Eagle Oil & Shipping Co. Ltd. for small four-wheeled and six-wheeled diesel locomotives. Another batch of these engines was shipped out to Mexico recently, and incorporated several improvements compared with the previous locomotives which were illustrated in the issue of this Supplement for May 17, 1935. As before, Gardner engines of 50 and 74 b.h.p. are fitted to the smaller and larger models, but a Vulcan-Sinclair fluid coupling is now fitted behind the engine and a Wilson-Drewry epicyclic gearbox forms the main constituent of the transmission in place of the previous normal box with sliding dog clutches. A number of modifications have been made to improve the accessibility and ease of control. The coupling rods have been provided with special dust protecting covers, and light auxiliary springs have been fitted over the main bearing springs. The 0-4-0 type locomotives weigh about  $6\frac{1}{2}$  tons and the 0-6-0 class 8 tons.



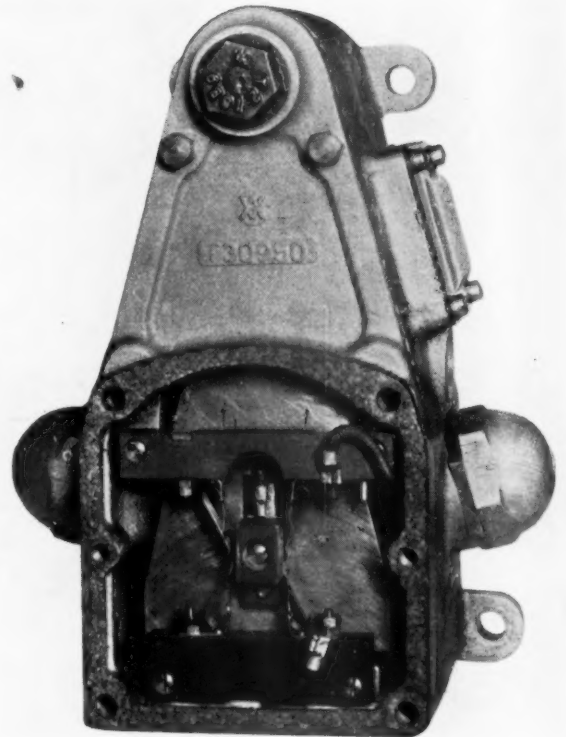
74 b.h.p. diesel locomotive for 2 ft. gauge



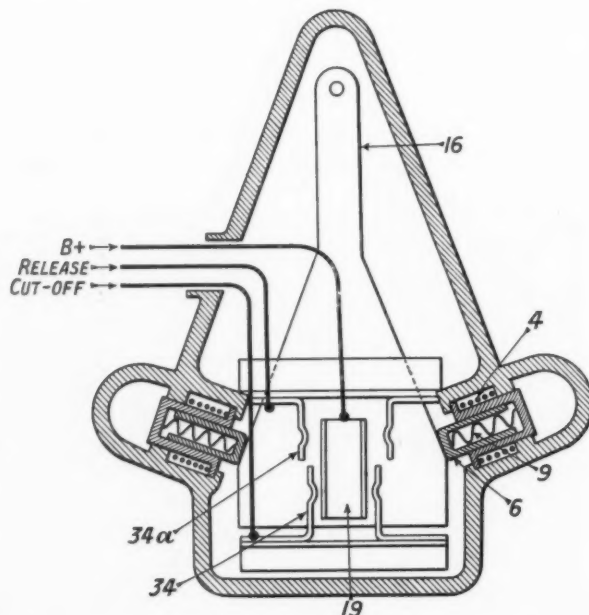
## A RETARDATION CONTROLLER FOR HIGH SPEED BRAKING

IN his paper on the braking of high-speed diesel trains which we abstracted in our issue of March 20, Mr. Joseph McCune, of the Westinghouse Air Brake Company, U.S.A., mentioned the use of an inertia device, the retardation controller, which permitted high braking ratios at high speed because it limited the braking ratio at low speeds. This device, which is made also by the Westinghouse Brake & Signal Co. Ltd. in this country, consists of a heavy pendulum mounted on ball bearings and which swings in the line of motion of the train. By reason of its inertia this pendulum reflects any change in train motion, its movement being in direct proportion to the rate of change. Therefore, the rate of retardation is accurately measured by calibrating the pendulum movement against restraining springs. The retardation controller is wired in the battery circuit to the magnets of the control valves to limit the retardation rate to a definite range. The pendulum swings over and completes the circuit to the cut-off magnet when a retardation rate of about 3 m.p.h.p.s. is reached, preventing further increase in the brake cylinder pressure. If, as in completing a stop, the operator fails to graduate off with the resultant increase in retardation rate, the pendulum swings farther, and when a rate of about 4 m.p.h.p.s. is reached, it completes the circuit to the release magnet which releases sufficient brake cylinder pressure to drop the rate to some value between the two above settings.

Should the retardation rate exceed that for which this controller is set, the latter influences the magnets of the control valve to reduce the brake cylinder pressure the necessary amount to produce the set rate. The cut-off magnet and release magnet of each control valve are connected in series with the retardation controller fixed contacts 34 and 34a respectively. Movable contact 19 on



General view of Westinghouse retardation controller



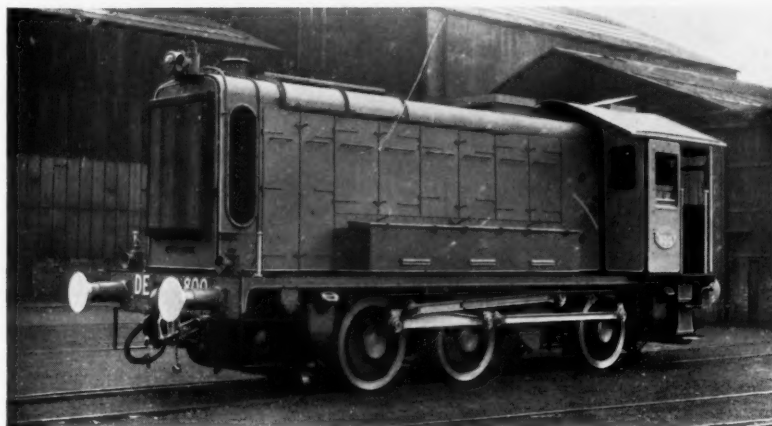
Diagrammatic representation of the Westinghouse retardation controller

the positive side of the battery circuit swings with the pendulum 16. Restraining springs 4 and 9 are calibrated against the pendulum inertia. When the retardation rate reaches about 3 m.p.h.p.s. the pendulum swings over, the movable contact 19 closes contact 34, energising the cut-off magnet, closing off further straight air-pipe flow and thereby limiting the brake cylinder pressure to this amount. If the retardation rate increases, as it normally does as the speed decreases, the pendulum swings farther, and, at a retardation rate of about 4 m.p.h.p.s., completes the second circuit through contact 34a, energises the release magnet, and permits straight air-pipe pressure to escape to the atmosphere through a safety valve, and thus produces reduction in the brake cylinder a pressure sufficient to drop the retardation rate to some lower value, or to its lower limit of 3 m.p.h.p.s.

The safety valve is set to 40 lb., below which it prevents exhaust. This definitely limits the activity of the retardation controller to provide a minimum safe braking pressure in event of abnormal action of this feature. A knife switch, easily accessible to the driver, is provided to allow him to cut out the retardation controller should this be necessary. Warning lights which flash in the cab when the retardation controller is active inform the driver of the establishment of the maximum retardation rate, which knowledge permits him to resume control from the brake valve.

## INDIAN BROAD-GAUGE SHUNTING LOCOMOTIVE

This six-wheeled locomotive is powered by a six-cylinder Armstrong-Sulzer engine developing 350 b.h.p. continuously at 875 r.p.m. On test the engine showed a fuel consumption as low as 0.365 lb. per b.h.p.hr.

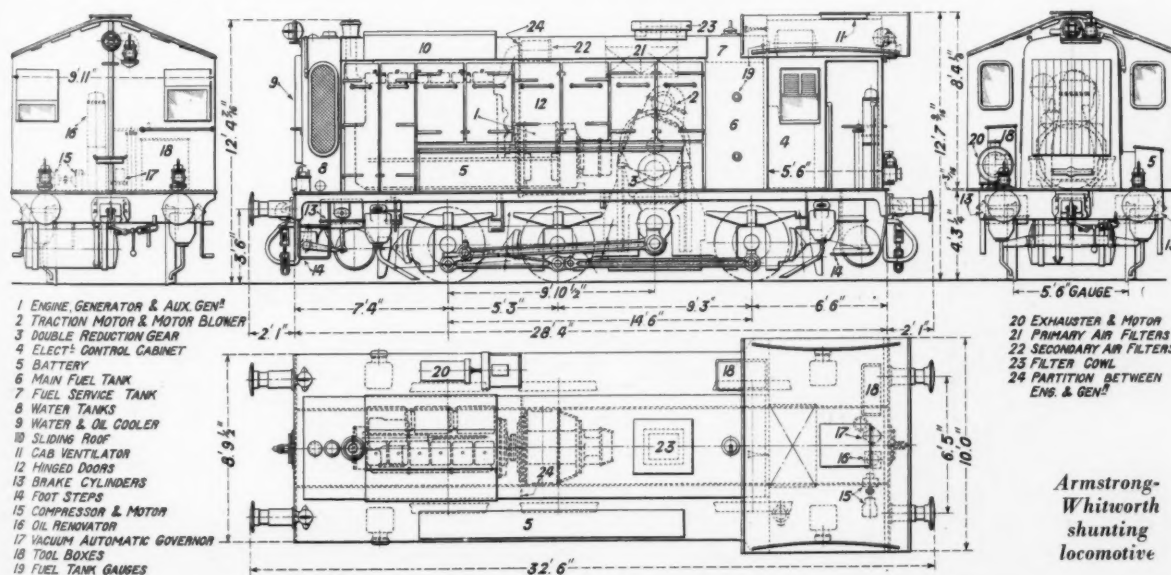


AMONG the diesel-electric locomotives recently built at the Scotswood works of Sir W. G. Armstrong-Whitworth & Co. Ltd. is a 48-ton shunter for the Bombay, Baroda & Central India Railway. In general design it is similar to the ten locomotives now being delivered to the L.M.S.R. and described in the issue of this Supplement for March 20, but there are sundry differences, principal among which is the broad gauge of 5 ft. 6 in.

Compared with the L.M.S.R. locomotives, the weight of 48 tons, governed by a limiting axle load of 16 tons, is a reduction of 2 tons; the maximum tractive effort is 24,000 lb. against 30,000 lb.; the top speed is the same, at 22 m.p.h.; and the wheels are 3 ft. 7 in. diameter compared with 4 ft. 3 in. Double-reduction gear is used to transmit the motor torque to the jackshaft, and the ratio is 9.3 to 1 compared with 11.1 to 1 in the L.M.S.R. units. The B.B.C.I. locomotive has vacuum and hand-brakes, the vacuum for the former being maintained by a Consolidated Brake-Reavell rotary exhauster with electric drive. National friction drawgear is used, and where-

ever possible the details such as axles, springs, brake blocks and fittings, and lubrication details are to Indian steam locomotive standards. The axleboxes are of bronze and work in cast steel guides.

In view of the dusty atmosphere in India, a special filtered air ventilation has been evolved. The air is drawn through Vokes filters into the compartment housing the main generator and the single traction motor, and is then expelled into the engine compartment, where the slight pressure tends to keep out the dust. The engine air intake leads from the generator compartment through a further filter. Air for the Serck radiators is drawn in at the sides of the engine casing and discharged to the front between the elements. The electric transmission arrangement is of the type standardised by Armstrong-Whitworth for heavy shunting locomotives and comprises a single spring-borne traction motor driving a jackshaft whence the torque is transmitted to the wheels through driving and coupling rods. The electrical equipment was made by Crompton, Parkinson & Co. Ltd. to Armstrong-Whitworth designs and specifications.



## A High-Speed Train and Big Locomotive for the Illinois Central Railroad

**K**NOWN as the *Green Diamond*, a 1,200 b.h.p. streamlined diesel-electric train has been put into service this month on the Chicago-St. Louis route of the Illinois Central Railroad, after making a 7,500-mile exhibition tour in the Middle-West. The name of the train is a development of the Diamond Special, one of the oldest of the Illinois Central main line services, a name itself derived from the diamond emblem of that railroad.

Built at a cost of approximately £86,000 by the Pullman Car & Manufacturing Company, the *Green Diamond* is making a round trip daily between Chicago and St. Louis, a total distance of 588 miles, covered at a running average of just under 60 m.p.h. It is unusual among the American streamlined diesel trains in that no 100 m.p.h. claims have been made for it, the owning railroad having contented itself merely with the statement that sustained speeds in excess of 80 m.p.h. are possible in normal service.

Five cars, fully articulated, make up the formation of the train. They extend over a length of 328 ft. 6 in. and tare 212 Engl. tons. There are 120 seats plus 24 in the diner and two at writing desks in the saloon. From front to rear the rake comprises a power car; a combined baggage and mail car; two ordinary passenger cars; and a dining-lounge car. The power car has a maximum

### *The first two units of a \$1,000,000 diesel programme*

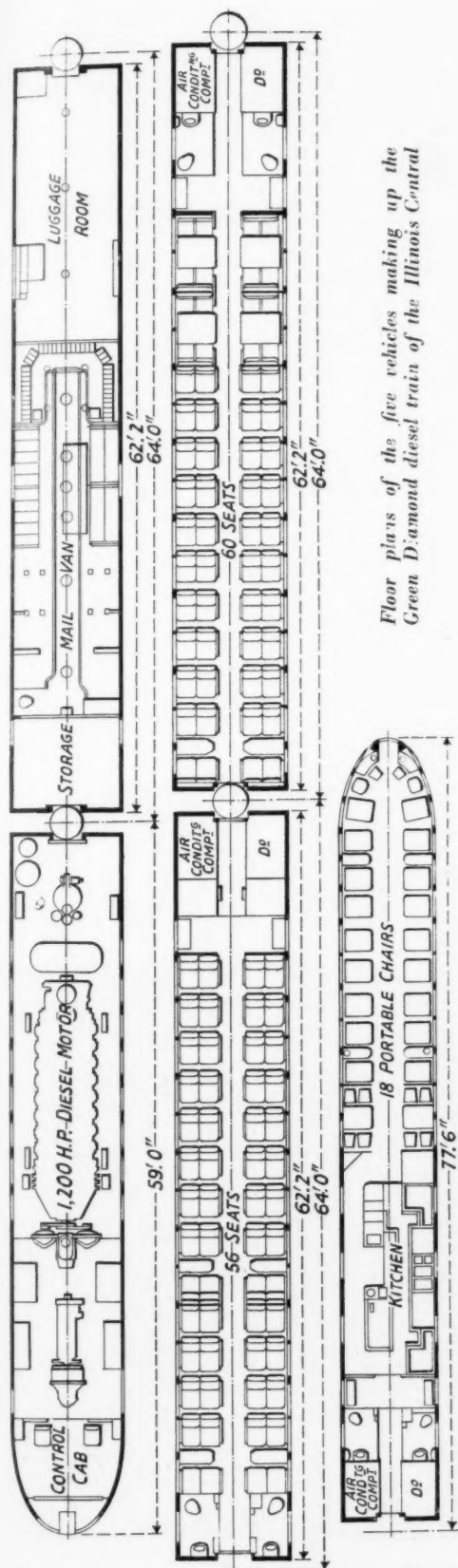
height of 13 ft. 2 in. and the other vehicles are 11 ft. 6 in. high. The aggregate weight of the trucks, including traction motors, is 63 tons, leaving 149 tons for the bodies, power equipment and auxiliaries.

Separate framing for the body and underframe is not used, the whole car frame being in one unit, of tubular shape except where the bogies break the continuity of the bottom sheet, which is formed by prolonging the side panels underneath to meet in the middle. This tubular frame has a depth of 11 ft. 6 in. at the centre and a width of 9 ft. 6½ in. The floor level is 3 ft. 4½ in. above the rail and 2 ft. 2 in. above the bottom of the tube frame. The side panel plates of the power car are of 15 USS gauge sheet, the bottom plate of 16 gauge, and the roof plate of 14 gauge. The assembly is a combination of riveting and spot welding. All the main frame members of plate, rolled, and bar sections, and the panel plates are of Cor-Ten steel, a chromium-copper-silicon steel product of the United States Steel Company. This metal has an ultimate strength of 31 tons per sq. in. minimum, a yield point of 22½ tons minimum, and an elongation in 2 in. of 27-22 per cent. It contains 0.5 to 1.5 per cent. of

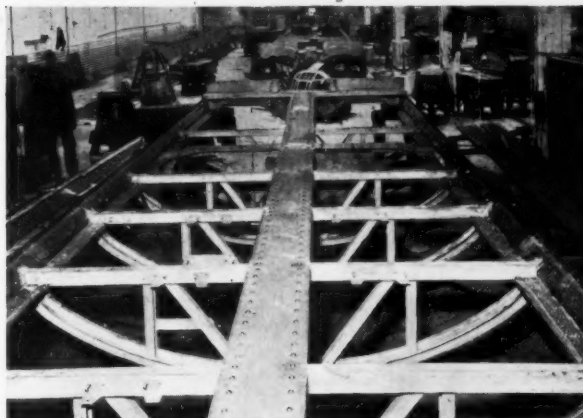
1,200 b.h.p. oil-electric  
train for the Chicago  
to St. Louis service







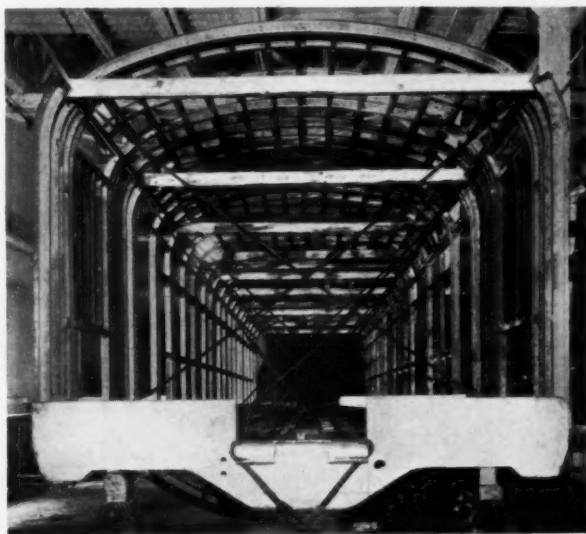
*Floor plans of the five vehicles making up the Green Diamond diesel train of the Illinois Central*



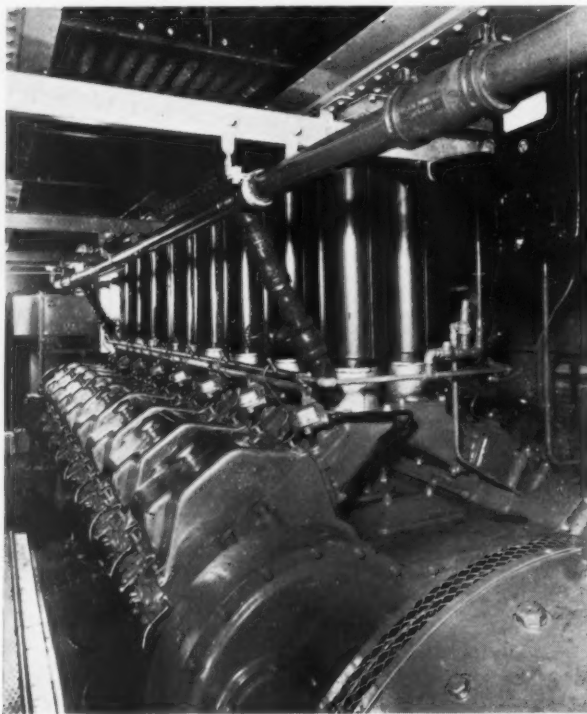
*Centre sill and bottom portion of power car frame*

chromium; 0.3 to 0.5 per cent. of copper; 0.5 to 1.0 per cent. of silicon; 0.1 to 0.2 per cent. of phosphorus; 0.1 to 0.3 per cent. of manganese; 0.1 per cent. of carbon; and a maximum sulphur content of 0.05 per cent. Its great resistance to corrosion and the relatively high yield point enable a saving in weight to be made compared with ordinary carbon steel.

Several of the accompanying illustrations show the details of the car frame construction. The centre sill of the power car is of web and cover plates with rolled chord angles and surmounted by pressed steel floor beams of flanged channel shape. At the articulation points these sills project from the car end to take the pivots. The side members are partly drawn sections and partly rolled plates; the side pillars are of pressings and in certain cases of two pressings welded together to form a box shape. The streamlined front of the power car is of built-up angles and plates formed to provide an anti-telescoping construction. Between the outer steel and inner aluminium alloy panels is a combination hair, felt and asbestos insulation, but round the base of the cars this insulating material is covered with Sisal-Kraft paper which is wrapped and sealed with waterproof cement. The interior finish generally is in aluminium, and the passenger portion of



*Body framing of one of the passenger cars*



1,200 b.h.p. engine and main generator

the train is air-conditioned. The steam-heating system is supplied from an oil-fired boiler in the power car.

All the bogies are of the four-wheeled type with Commonwealth cast steel one-piece frame structures. The driving wheels are 36 in. in diameter and have the treads turned to a taper of 1 in 20; the carrying truck wheels have a diameter of 33 in. and have parallel treads. Timken roller bearings are fitted to all axles. The air

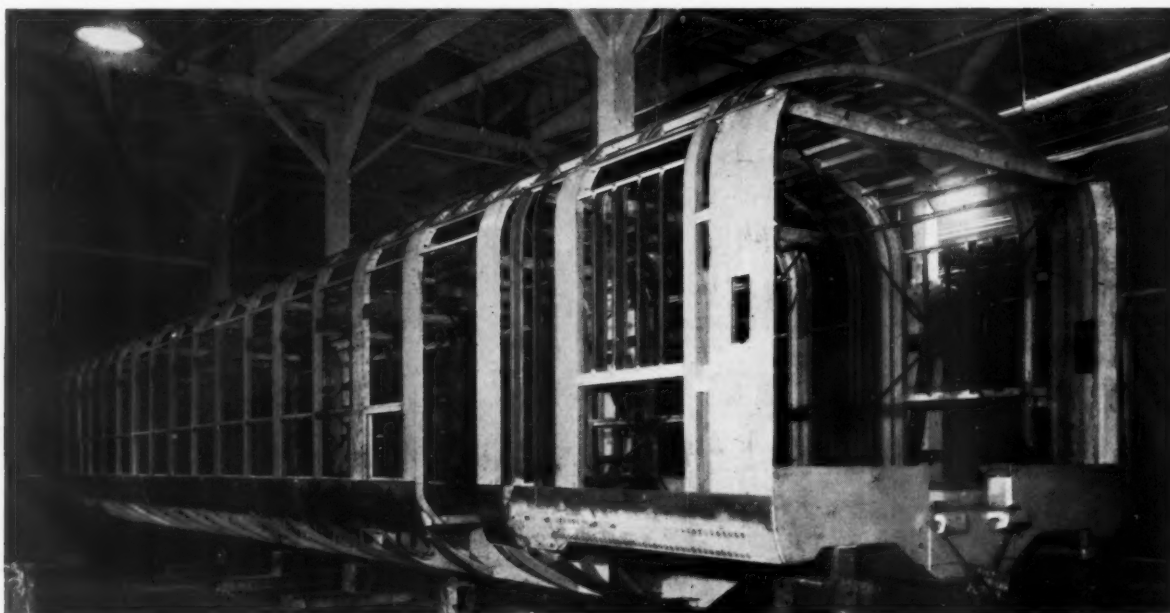
brake force is applied through clasp brakes actuated by a separate cylinder for each wheel, and the control for the maintenance of the greatest possible deceleration rate from top speed to rest is on the electro-pneumatic Decelatron system of the New York Air Brake Company. Many of the brake pipes and fittings are of copper, but those on the bogie itself are of steel. Handbrakes are fitted in the driving compartment and at the front end of the rear car; in each case they act only on the adjacent bogies, which weigh respectively 14.8 and 8.5 tons and carry 33 and 27.5 tons.

The power unit of the train is one of the standard Winton 16-cylinder two-stroke engines developing 1,200 b.h.p. at 750 r.p.m. and having the cylinder blocks and crankcase as an integral unit of welded steel. This engine is assisted by a 110 b.h.p. Winton engine, running at 1,200 r.p.m., which provides the power for battery charging and for various auxiliaries through a 60 kW. three-phase generator, so that the full 1,200 b.h.p. is available for traction. Attached to this auxiliary generator is an exciter which furnishes excitation current to the fields of the main generator. The electrical equipment is of G.E.C. design and construction. The four 300 h.p. traction motors are of the self-ventilated nose-suspended type and are mounted on the first two bogies. The current for the engine starting, transmission control, cab and engine room lights, and emergency train lighting, is taken from a 32-cell Exide-Ironclad battery with a capacity of 450 amp. hr. at the 10-hr. rate of discharge.

#### Illinois Central Locomotive

In 1934 three heavy freight transfer oil-electric locomotives were ordered by the Illinois Central, the first with two 900 b.h.p. Ingersoll Rand engines; the second with two 900 b.h.p. two-stroke Winton engines; and the third with one 10-cylinder Vee two-stroke Busch-Sulzer engine. The Ingersoll-Rand locomotive has been delivered, and is shown in the last of the accompanying illustrations.

This locomotive, which is the heaviest and most powerful single-unit diesel locomotive in existence, weighs 152 Engl. tons, all of which is available for adhesion. The starting

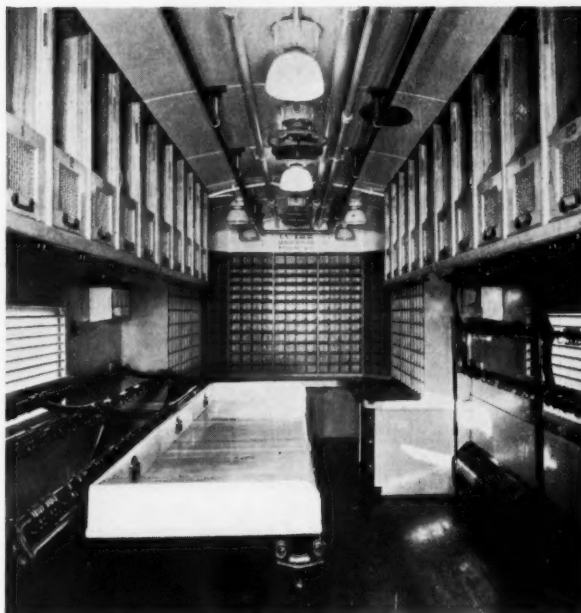


Body framing of one of the passenger cars of the Illinois Central diesel train

tractive effort is 102,000 lb. and this figure can be maintained up to 3.7 m.p.h.; on the continuous rating the tractive effort is 38,800 lb. at 13.8 m.p.h., and on the one-hour rating 44,400 lb. at 12.0 m.p.h. The 39-in. wheels of each bogie are spread over a base of 11 ft. and the bogies are pitched at 37 ft. 4 in. centres. The total wheelbase is 48 ft. and the length over coupler knuckles 60 ft. The truck frames are one-piece Commonwealth steel castings; they carry the centre couplers and are articulated so that the buffing and drag stresses are kept away from the cab. The cab and underframe are welded structures; the main underframe members are four I beams with a depth of 24 in. and a weight of 120 lb. per foot. These beams were cut to a taper at the ends and transverse stiffening pieces welded on. There is a driving position at each end of the locomotive and a single engine room in the middle.

The Ingersoll-Rand engines are of the vertical six-cylinder type with cylinders 14½ in. bore by 16 in. stroke; the rated output of 900 b.h.p. is developed at 550 r.p.m. The crankcase is a steel casting and sits on a welded steel base frame secured to the locomotive underframe. Each cylinder is a separate casting with integral water jackets and is secured to the crankcase by 20 studs. The cylinder heads contain the inlet and exhaust manifolds and the adjoining sides of the heads are flanged and bolted together with a metal to metal joint. Only one inlet and one exhaust valve per cylinder are used. The crankshaft is in a single piece with hollow-bored pins and counterweights bolted to the crank webs. The main bearings have a white metal lining on a steel shell and the same type is used also for the big end bearings. The pistons are steel castings but have a babbit lining over that portion of the skirt below the bottom pressure ring. Fuel is delivered to the two injection nozzles of each cylinder by a six-ram Bosch fuel pump. The radiators for the cooling water are located at each end of the locomotive with the elements facing to each side and to the front. The main fuel tank, with a capacity of 1,030 Engl. gal., is placed beneath the cab, beside the battery and air reservoirs.

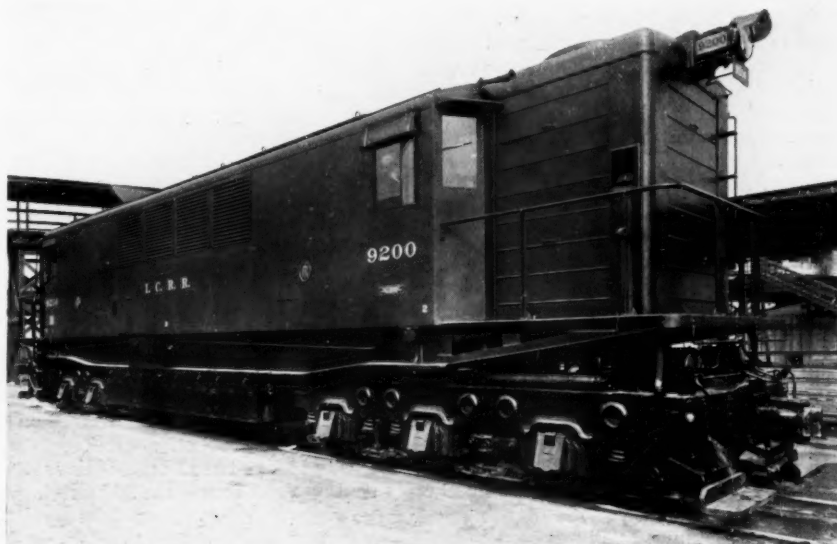
Directly but flexibly coupled to each engine is a G.E.C. main generator with a 125-volt constant voltage auxiliary generator carried on an extension of the armature shaft. The generators are connected in series with the mid point earthed, and the motors can thus be supplied with the full voltage of both generators but with half the voltage



Interior of the mail and baggage car of the Green Diamond

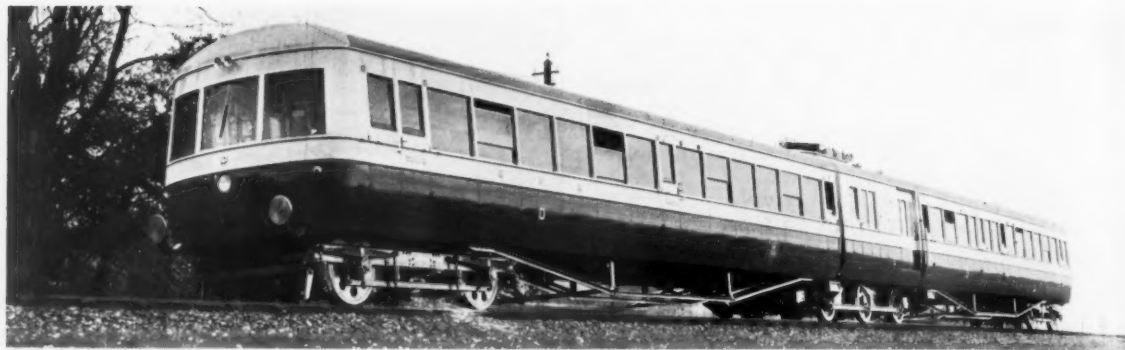
to earth. On top of this auxiliary generator is a belt-driven exciter for supplying variable voltage current to the main generator fields. The six traction motors are of the normal G.E.C. nose-suspended type with forced ventilation. There are two motor-driven blowers each supplying the three motors on one truck with a maximum of 4,500 cu. ft. of air per min. The electric control is arranged for three motor combinations with automatic transition. In the first combination there are two parallel groups of three motors in series; in the second combination there are three parallel groups each with two motors in series; and in the third group all six motors are in parallel. If one engine for any reason is out of action, the top tractive efforts are still available, but at reduced speed.

This 1,800 b.h.p. oil-electric transfer locomotive was built for the Illinois Central Railroad at a cost of £39,000. It is used for hauling freight trains of up to 125 cars of 36 Engl. tons capacity from Chicago to Markham yard, at Harvey, Ill., and has supplanted two Mikado steam locomotives





## New Articulated Diesel Train in Ireland



Two views of the 150 b.h.p. Gardner-engined train on the Belfast-Lisburn suburban service of the Great Northern Railway of Ireland



### French Colonial Orders

The French Colonial Ministry has placed orders recently for 15 diesel railcars and three diesel locomotives, for distribution to various colonies in Africa. The Madagascar State Railways will have two metre-gauge diesel railcars for the conveyance of European passengers and their luggage from Fianarantsoa to the East Coast. Each car will have a seating capacity of 24, lavatory accommodation, and postal and luggage compartments. Trailer coaches for the accommodation of the native population will probably be added. Three diesel-electric locomotives fitted with 600 b.h.p. engines are destined to haul goods trains over the same lines.

In French Occidental Africa, the Ivory Coast Railway is to take delivery of two metre-gauge diesel railcars for European night passenger service over the 800 km. (496-mile) section between Abidjan and Bobo-Dioulasso. Each car will accommodate from 10 to 15 persons in comfortable sleeping compartments, and will also include a buffet and postal and baggage compartments. The Dakar-St. Louis line is to have six metre-gauge diesel railcars, to carry a small number of Europeans and a large number of natives over the Dakar-Kaloak and Dakar-St. Louis sections. Two railcars for the same gauge have also been ordered to convey a limited number of Europeans and natives over the various branch lines of the system. The Reunion Railway will have three diesel cars.



The Fliegende Münchener which began service between Munich and Berlin today (see also page 984)

**UNION PACIFIC STREAMLINERS.**—In the late summer the Union Pacific Railroad will place in service two new 2,400 b.h.p. streamlined trains, to be known as the *City of Denver*. They are to run between Chicago and Denver on a 16-hr. schedule, and it is claimed that they will be the world's fastest trains for distances exceeding 805 miles, as they will put up an average of 65.5 m.p.h. for the 1,048 miles journey. The proposed schedule allows 8 hr. for the 488 miles between Chicago and Omaha, over Chicago and North-Western track (an average of 61 m.p.h.), and a further 8 hr. for the 560 miles over Union Pacific lines from Omaha to Denver (averaging 70 m.p.h.), giving a reduction of over 9 hr. on the present fastest schedules. The Omaha-Denver run will be a world record for distances exceeding 360 miles. Articulation will be applied between cars 6 and 7, 9 and 10, and 11 and 12. Other cars will have two trucks.

## HALF A DOZEN DIESEL RAILCARS FOR JUGOSLAVIA

### *Bogie and four-wheel types*

VENTURING into the field of diesel traction for the first time, the Yugoslav State Railways have just taken delivery of six diesel railcars from the Danish firm De forenede Automobilfabrikker Limited, Odense. Three of the cars are light four-wheeled models; the remaining three are of the three-bogie type, similar to those used on the Sydfynske Railways of Denmark (see issue of this Supplement for January 27, 1933). The gradients to be negotiated on the Yugoslav lines are occasionally very severe, sometimes rising to 1 in 59 for a distance of five miles.

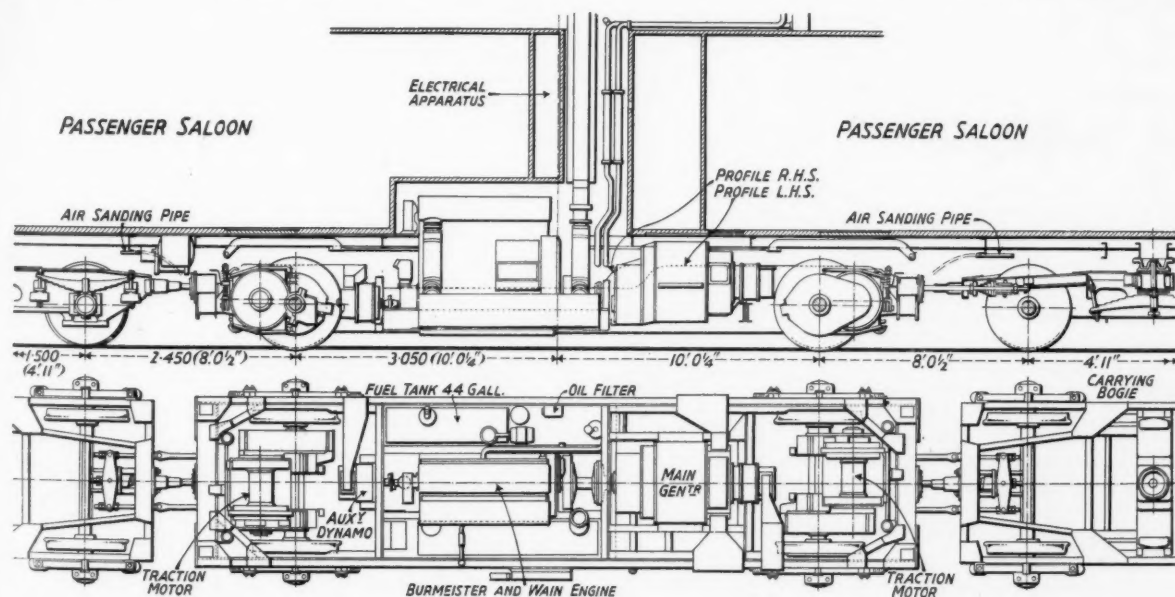
Designed for a maximum speed of 70 km.p.h. (43.5 m.p.h.), the lighter cars tare 13.5 metric tons and are not intended to haul trailers. They are powered by six-cylinder 90 b.h.p. Hesselmann engines running at 2,000 r.p.m. The transmissions vary, two being mechanical, with synchronised constant mesh gearboxes, and the third is of the Voith hydraulic type. A compressed air brake is fitted to this car and both forward and reverse gears are controlled by the same medium. The body is of steel and has a seating capacity of 20 second class (leather upholstered) and 30 third class, with an additional eight tip-up seats. The car is heated partly by the cooling water and partly by a coke-fired hot water boiler placed beneath the body.

The three heavy cars resemble the lighter tric in speed and body construction; they tare 53.5 metric tons and are



280 and 90 b.h.p. diesel railcars for Yugoslavia

designed to haul two 24-ton trailers. Each vehicle runs on two bogies, while in the centre a third bogie with a long wheelbase supports the engine. The whole floor space of the car can thus be used for passenger accommodation. Their total seating capacity of 78 is made up of 30 second class and 38 third class seats, plus 10 tip-ups. There is also a luggage compartment and boiler and accumulator rooms. The cars are heated by means of the cooling water and by an oil-fired steam boiler, which also heats the trailers. The lighting is on the Pintsch electric system. The six-cylinder two-stroke Burmeister & Wain engine has cylinders 150 mm by 220 mm. and develops 280 b.h.p. at 1,100 r.p.m. Between engine and generator is a step-up gear increasing the generator speed to 1,500 r.p.m. The electric transmission is on the Ward-Leonard system and the contactors and certain other electrical equipment are mounted on the engine bogie. There are two nose-suspended traction motors. The engine cooling water radiators are mounted in sections along the roof.



Engine bogie of 280 b.h.p. diesel car of the Yugoslav State Railways

## NOTES AND NEWS

**Ceylon Trains.**—An order for three four-car articulated oil-electric trains has been ordered from the English Electric Co. Ltd., by the Ceylon Government Railways for service on the 5 ft. 6 in. gauge lines.

**Diesel Railcars in Queensland.**—After experimenting with a 130 b.h.p. railcar with an A.E.C. oil engine, the Queensland Government Railways have set to work four further cars fitted with 102 b.h.p. Gardner engines. These cars tare 9 tons and in normal service haul two trailers with an aggregate tare weight of 14 tons.

**Another German Diesel Service.**—As a trial run before the commencement of the regular service on May 15, one of the new German diesel trains made a special trip between Munich and Berlin (Anhalter Bhf.). The 425·6 miles were covered in 6 hr. 30 min., that is, 6 min. less than the 64·5 m.p.h. schedule which came into force today.

**American Streamlined Train Mileage.**—Although the two 660 b.h.p. diesel-electric trains named *The Rebel* (see issue of this Supplement for August 9, 1935) were not put into service on the Gulf, Mobile & Northern Railroad until last summer, they covered an aggregate of 135,045 miles up to December 31 last, or 67,522 miles per train, equivalent to approximately 135,000 miles a year.

**Diesel-Hauled "Super-Chief."**—The 3,600 b.h.p. Winton-engined diesel locomotive is now hauling the *Super-Chief* luxury train of the A.T.S.F. between Chicago and Los Angeles. A new stainless steel train is being built for this service by the E. G. Budd Manufacturing Company. It is expected to be completed about the end of this year and the diesel locomotive then will have only about half the present weight to haul.

**American Shunter.**—The Westinghouse Electric & Manufacturing Company has built a twin-engined 1,600 b.h.p. oil-electric shunting locomotive scaling 119 tons. The engines are of the latest Westinghouse 12-cylinder Vee type developing 800 b.h.p. at 900 r.p.m. The maximum designed operating speed is 50 m.p.h., but at the continuous rating the speed is 15·6 m.p.h. and the tractive effort 32,000 lb. The starting tractive effort is 80,000 lb. Over couplers the locomotive measures 53 ft.

**Lister-Blackstone Combination.**—By an agreement dated April 21, 1936, R. A. Lister & Co. Ltd., of Dursley (Glos.), and Blackstone & Co. Ltd., of Stamford, will in future co-operate. Under the agreement Lister's have acquired a substantial holding in the Blackstone firm, and Mr. Percy Lister, the Chairman of Lister's, has been appointed Chairman of Blackstone's. While the two concerns will continue to operate separately, their association will ensure increased efficiency of production.

**Mylius Drive Demands.**—Deutsche Getriebe G.m.b.H., of Berlin, has recently received considerable orders for the Mylius mechanical transmission. Repeat orders, in some cases for series of 30 and 40 units, are being delivered to numerous railways in Germany, France and Rumania. This form of gear is also becoming increasingly popular in South America, as may be seen from renewed orders from Brazil and a first delivery to Peru. Five-speed Mylius drives are already under construction for 250 b.h.p. units, and five-speed gears for 350 b.h.p. each will shortly be in operation.

**Büchi Superchargers.**—A steady increase in the number of firms using their system of turbocharging is reported by the Büchi Syndicate, of Winterthur, who state that all

the principal Continental and American companies are adopting it on a big scale. The small dimensions, light weight, low fuel consumption, small coolers, and good starting properties have encouraged its application to railway units. The Deutz Motorenfabrik is one of the oldest general licensees for the Büchi Syndicate, and last year the M.A.N. took out a similar licence. Sulzer Bros., Winterthur, have also just concluded a general licence agreement for the turbo-charging of their four-stroke diesel engines on this system.

**Fluid Transmission Agreement.**—An agreement involving the pooling of nearly one thousand patents on fluid transmissions has been completed in a collaboration arrangement reached between the Vulcan-Sinclair group, headed by Hydraulic Coupling Patents Limited of Isleworth; the Deutsche Schiffund Maschinenbau A.G. of Bremen, which incorporates the Vulcan-werk, Hamburg, where the Vulcan fluid coupling was first developed for marine propulsion according to the designs of Dr. Föttinger; the J. M. Voith Maschinenfabrik, of Heidenheim, who make fluid torque converters for railway use; and the Allgemeine Electricitäts Gesellschaft (A.E.G.), of Berlin. Hydraulic Coupling Patents Limited have had close collaboration agreements with the Vulcan-werk and Voith for some time.

**South American Development.**—The Central Uruguayan Railway and the Uruguayan State Railways have reached an agreement, sponsored by the Uruguayan Government, to co-operate with a view to improving transport facilities in Uruguay. The main provision is that the State Railways, which already have a number of railcars either in service or on order, shall, by further investment of capital, increase the number so that they may hire to the Central Railway sufficient vehicles to assure a daily passenger service over all lines. Two types of diesel-engined coaches will be adopted; the first, for long-distance service, will have seating capacity for approximately 60 first class and 80 second class passengers; the second will be a single vehicle with an approximate capacity of 30 first and 50 second class passengers. Both types will have buffet, luggage, parcels and mail accommodation and will run at speeds of not less than 60 m.p.h. on level track and 40 m.p.h. on grades. Maintenance costs are to be borne by the State Railways, who will also provide driver, fuel and lubrication.

**Belgian Railcars.**—Several three-car diesel trains are now in regular service on the Belgian National Railways. During recent tests a unit having two 410 b.h.p. Maybach engines and A.C.E.C. electrical transmission, covered the 57·6 miles from Brussels to Bruges in 47 min., at an average of 73·5 m.p.h. The 39·8 miles from Brussels-Nord to Namur, with gradients of 1 in 62, was covered in 42 min. Equally good results were obtained with another car equipped with two Carels-Ganz engines of 380 b.h.p. and S.E.M. electrical transmission. Three of these diesel rakes are now running in normal service from Brussels to Charleroi, Mons, and Ghent, and cover the respective distances of 35·0, 37·5, and 32·3 miles in 41, 38 and 32 min. A trial run between Brussels and Ostend (71·2 miles) was made in 65 min. and over the 62 miles from Brussels to Liège the timing was 60 min. A speed restriction to 37 m.p.h. is enforced between Ans and Liège on the latter journey. New services were inaugurated from today with these cars between Brussels and Courtrai, Charleroi and Namur, and Brussels (Quartier Léopold) and Namur.